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BLOOD PICTURE AFTER SPLENECTOMY IN CHILDREN

WITH SPECIAL REFERENCE TO PLATELETS

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The effect of the removal of the spleen is reflected in the blood picture in various ways, depending on the causative factors underlying the indications for splenectomy. Thus, after removal of a previously normal spleen because of sudden rupture due to traumatism, the blood cell count differs from that following removal of an enlarged spleen for chronic hemorrhagic thrombocytopenia or for Cooley's anemia. The most constant change is a rise in the number of platelets, and on this point we have laid special stress, while studying the effect on the other elements of the blood as well.

OBSERVATIONS

Forty-four children on whom splenectomy was performed have been studied. The conditions treated were as follows: traumatic rupture in 3 cases; rheumatic disease in 20; splenomegaly of undetermined origin in 1; congenital hemolytic icterus in 4; Cooley's anemia in 8, and hemorrhagic thrombocytopenia in 8.

The ages of the children ranged from 11 months to 12 years and 11 months. Twenty-three of the patients were girls, and twenty-one were boys.

Traumatic Rupture.—The three children with traumatic rupture were boys. R. M. and R. B. were 10 years old, and S. Y. was 11. The postoperative reaction of the oldest boy (S. Y.) has been reported by Shore and Kreidel.[1] This boy's platelet count rose on the sixth day and reached its peak on the twelfth. The other two patients responded in

From the Laboratories of the Babies Hospital and Columbia University.

1. Shore, B. R., and Kreidel, K. V.: Study of Blood Platelets After Removal of a Ruptured Spleen, Ann. Surg. **99**:307, 1934.

a similar manner, though varying somewhat in the time of their reaction. In the case of R. M. the platelet count remained about the same for three days and rose to a peak on the seventh day, while R. B. showed a rise on the fifth day with the peak occurring on the tenth day. The level of over 1,000,000 platelets per cubic millimeter was maintained, respectively, for eight, eleven and seventeen days, and in each case the boy was discharged with that high number of platelets in his blood. One patient was not seen after the twenty-third day (R. M.); one (R. B.) was seen after six weeks, and one (S. Y.), at intervals for a year and four months. At that time S. Y. had 360,000 platelets per cubic millimeter, while the others still had over 700,000 (table 1).

TABLE 1.—*Blood Picture Following Splenectomy for Traumatic Rupture of the Spleen in a Boy (S. Y.) Eleven Years Old*

Time After Operation	Date	Hemoglobin		Red Blood Cells	Platelets	White Blood Cells	Polymorphonuclears	Lymphocytes	Monocytes	Eosinophils
		Gm.	Per Cent							
	5/27/31 (4 a.m., splenectomy)									
	5/27/31	11.4	68	3,192,000	504,000	11,500	83	14	1	..
1 day	5/28/31	10.2	60	3,016,000	432,000	9,000	87	12	..	..
3 days	5/30/31	10.2	60	3,272,000	408,000	9,000	81	18	..	1
6 days	6/ 2/31	10.2	60	3,424,000	632,000	10,950	81	17	1	1
8 days	6/ 4/31	11.0	65	2,896,000	984,000	8,750	77	20	..	2
9 days	6/ 5/31	11.0	65	3,446,000	1,328,000	11,900	80	10	6	1
10 days	6/ 6/31	11.5	68	3,832,000	1,488,000	8,400	85	13	1	1
12 days	6/ 8/31	11.9	70	3,880,000	1,640,000	13,650	79	18	2	1
13 days	6/ 9/31	11.9	70	3,424,000	1,600,000	10,050	68	28	5	..
15 days	6/11/31	11.9	70	3,600,000	1,576,000	6,750	71	26	3	..
17 days	6/13/31	13.2	78	4,088,000	1,404,000	6,300	63	25	11	1
28 days	6/24/31	13.6	80	4,088,000	576,000	7,700	40	43	10	6
1 mo.	7/ 9/31	14.9	88	4,128,000	728,000	7,900	40	49	11	..
2 mos.	8/ 5/31	15.3	90	4,192,000	560,000	8,300	40	53	4	2
3 mos.	9/17/31	13.6	80	4,016,000	664,000					
4 mos.	10/22/31	15.3	90	4,040,000	728,000	7,050	34	50	12	4
7 mos.	1/14/32	13.6	80	4,584,000	728,000	8,150	51	44	2	3
1 yr., 4 mos.	9/ 8/32	15.2	90	4,920,000	360,000	7,200	45	48	1	..

No one of the three showed postoperative anemia. On the contrary, the hemoglobin content and the number of red cells rose steadily during the time of hospitalization, and the high levels were maintained for seven months in one case and for six weeks in another. The initial high white cell count and the increased proportion of polymorphonuclears fell to normal in the second week, and the lymphocytes rose. However, the steady increase in lymphocytes was not maintained until the fourth week, and then the percentage remained higher than normal for the boy's age during the entire term of observation, which was sixteen months in one instance. Lymphocytosis is listed by Naegeli [2]

2. Naegeli, O.: Blutkrankheiten und Blutdiagnostik, ed. 5, Berlin, Julius Springer, 1931.

as a constant sequel to removal of the spleen. The anemia found in animals [3] following splenectomy is evidently not present in young human subjects after splenectomy for traumatic rupture of the organ. In the third week both monocytes and eosinophils increased, the proportion of the former rising to as high as 10 to 12 per cent and the latter not over 6 per cent, the rise lasting through an irregular period. The microscopic picture of the removed spleen was not abnormal.

Rheumatic Disease.—In the course of Dr. Coburn's study of rheumatic disease a group of twenty children had the spleen removed. There were fifteen girls and five boys between the ages of 6 years and 12

TABLE 2.—*Blood Picture Following Splenectomy for Rheumatic Disease in a Child Nine Years Old (V. D.)*

Time After Operation	Date	Hemoglobin		Red Blood Cells	Platelets	White Blood Cells	Polymorphonuclears (Schilling)	Lymphocytes	Monocytes	Eosinophils
		Gm.	Per Cent							
	10/18/32	14.4	85	4,024,000	352,000	6,400	59 (4-21-34)	35	2	3 (and 1 myeloblast)
	10/19/32 (splenectomy)									
1 day	10/20/32	16.2	95	4,100,000	440,000	21,500	92 (2-35-55)	8	..	..
2 days	10/21/32	16.2	95	4,080,000	408,000	17,500	86 (4-24-58)	14	..	..
3 days	10/22/32	16.2	95	4,410,000	518,000	18,050	81 (1-29-51)	17	2	..
5 days	10/24/32	15.6	92	4,110,000	501,000	12,250	73 (2-17-34)	23	..	3 (and 1 myeloblast)
6 days	10/25/32	16.2	95	4,008,000	736,000	11,600	65 (1-26-38)	28	..	6
7 days	10/26/32	16.2	95	4,140,000	536,000	12,250	76 (3-22-51)	21	3	..
8 days	10/27/32	16.4	97	4,116,000	880,000	10,800	60 (3-20-27)	34	..	5 (and 1 myeloblast)
9 days	10/28/32	17.2	100	4,352,000	908,000	9,700	64 (1-23-40)	31	5	..
10 days	10/29/32	16.6	98	4,600,000	960,000	8,900	57 (1-20-36)	41	2	..
12 days	10/31/32	17.0	100	4,472,000	1,028,000	10,050	64 (2- 5-57)	33	1	2
13 days	11/ 1/32	17.8	105	4,130,000	1,040,000	11,000	65 (1-17-47)	33	1	1
14 days	11/ 2/32	17.0	100	4,424,000	1,048,000	12,150	41 (1- 8-32)	54	1	3 (and 1 basophil)
2 years	6/ 3/35	11.9	70	3,656,000	656,000	10,250	61 (3-24-34)	36	1	2

years and 11 months. The rise in the platelet count began from the first to the eighth day, beginning in fourteen by the fourth day and in six afterward. The peak was attained from the sixth to the fourteenth day (after the tenth day in twelve and before in eight). The numbers were high, being over 1,000,000 in every case.

The children were not anemic and did not become so after the operation (table 2).

Splenomegaly of Undetermined Origin.—Splenomegaly of undetermined origin occurred in a boy, 2 years and 9 months old, who had hematemesis and a normal blood picture. Six months later the spleen

3. Krumbhaar, E. B.: The Changes Produced in the Blood Picture by the Removal of the Normal Mammalian Spleen, Am. J. M. Sc. **184**:215, 1932.

was removed. The platelet count rose in two days, reached a peak of 1,032,000 in fifteen days, fell to 690,000 in a month and rose no higher than 704,000 in the following eight months, that is, up to the time he was 4 years old. The hemoglobin content was 63 per cent, and the red cell count was 3,752,000, with 0.75 per cent reticulocytes. He was mildly anemic. The leukocytes numbered 8,600, the polymorphonuclears 36 per cent, the lymphocytes 58 per cent, which is a high normal at his age, and the eosinophils 6 per cent. The rise in the platelet count after splenectomy began early and reached a peak in two weeks, so that it resembled the curve for some of the rheumatic patients.

Congenital Hemolytic Icterus.—Four children who had had the spleen removed for this condition were studied. Three were girls, two aged 11 years and one 8 years and 9 months, while the youngest patient was a boy 19 months old. The postoperative rise in platelets began on the first day in the two younger patients and on the fourth day in the older two. The peak was reached on the eighth day in the former and on the tenth to the thirteenth day in the latter pair. More than 1,000,000 platelets per cubic millimeter were constantly present over a period of two months in the youngest girl and, with slight remissions to 908,000, for a year in the boy. The count of one of the older girls maintained that level for nine days; then after a fall to 720,000 it rose again to 1,016,000 in two and one-half months. The count of the other girl continued high for only twelve days and then fell and rose again to over 900,000 after four months, staying at that level for about a year. Eighteen months after splenectomy the platelets numbered 544,000 (table 3).

An interesting feature of these cases is the course of the reticulocyte count after splenectomy. Three patients (girls) showed a steady fall after the first day, with a steep drop on the second or third day to less than 1 per cent, this level being maintained throughout the periods of observation, two and one-half, ten and eighteen months, respectively. The youngest child, whose case was atypical, showed an initial rise before a drop to normal, followed within two months by a rise beyond the preoperative figures. The rise continued for over a year.

The three patients whose condition was typical showed a steady increase in hemoglobin (100 per cent) and red cells (5,000,000) and were no longer anemic on dismissal from the hospital. Lymphocytosis of from 36 to 53 per cent was present from two and one-half to eighteen months after operation in the three girls. The rise in the monocyte count was mild and short; the rise in the percentage of eosinophils was maintained over a longer period.

Cooley's Anemia.—In this group there were eight patients, four boys and four girls, from 11 months to 5 years of age. The rise in the

platelet count in these children was slow, mild and not sustained. In only one child did the number reach 1,000,000 in the seventh week, and it stayed there only six days. The rise had begun on the seventh postoperative day. One child showed no rise over a period of twenty-one months. Another showed a rise on the first day and a peak of 928,000 on the thirteenth day, but the subsequent course was irregular, the number ranging between 400,000 and 650,000 over a period of three years. In one girl a rise beginning on the sixth day resulted in a peak of 960,000 in sixteen days, after which the number fell during the sub-

TABLE 3.—*Blood Picture Following Splenectomy for Congenital Hemolytic Icterus in a Child Eleven Years Old (D. L.)*

Time After Operation	Date	Hemoglobin Gm.	Hemoglobin Per Cent	Red Blood Cells	Platelets	White Blood Cells	Polymorphonuclears (Schilling)	Lymphocytes	Monocytes	Eosinophils	Reticulocytes
	11/16/33	11.9	70	3,552,000	680,000	12,950	70 (2-30-38)	..	..	..	21.5
	11/18/33	11.0	65	3,216,000	584,000	8,800	76 (2-38-36)	14	4	6	20.9
	11/20/33	10.5	62	3,136,000	624,000	12,300	75	20	2	3	22.5
	11/27/33	10.2	60	3,032,000	624,000	6,550	65	29	1	5	20
	(9:30 a.m., splenectomy)										
2 hr. (11:30 a.m.)		15.3	90	4,584,000	648,000	24,700	97 (9-76-12)	3	..	..	22.0
3½ hours	.....	....	..	4,208,000	640,000	21,900	90 (1-80- 9)	10	..	..	19.6
5½ hours	.....	....	..	4,232,000	616,000	22,100	96 (1-88- 7)	4	..	..	19.0
7½ hours	.....	....	..	4,264,000	600,000	20,800	90 (1-91- 8)	1	..	..	20.6
1 day	11/28/33	15.3	90	4,424,000	648,000	26,200	97 (4-58-35)	2	1	..	17.1
2 days	11/29/33	14.9	88	4,224,000	632,000	21,300	99 (3-74-22)	1	..	..	9.6
4 days	12/ 1/33	14.4	88	4,496,000	832,000	17,800	74 (7-37-30)	14	1	11	0.88
5 days	12/ 2/33	14.5	85	4,576,000	1,016,000	14,650	75 (3-50-23)	18	4	2	0.48
7 days	12/ 4/33	14.5	85	4,176,000	1,400,000	13,400	77 (6-42-29)	15	4	3	0.16
8 days	12/ 5/33	14.6	86	4,540,000	1,528,000	9,850	49 (3-40- 6)	31	7	9	0
10 days	12/ 7/33	14.0	88	4,712,000	1,496,000	8,750	43 (7-15-21)	51	1	5	0
14 days	12/11/33	14.7	87	5,000,000	1,656,000	9,550	44 (5-29-10)	50	..	..	0
2 months	1/31/34	15.3	90	5,120,000	728,000	8,100	58	29	9	2	1.2
8 months	7/18/34	17.0	100	4,992,000	920,000	14,550	54 (7-13-34)	43	2	..	0
11 months	10/17/34	17.5	103	5,912,000	928,000	9,150	57 (5-18-34)	37	1	4	0.64
14 months	1/16/35	14.4	85	4,888,000	896,000	11,450	49 (2- 8-39)	42	3	6	1.8
1½ years	5/22/35	17.0	100	5,072,000	544,000	10,600	54 (1-20-33)	42	2	2	1.1

sequent two years, ranging from 370,000 to 640,000. A boy 3 years old showed a rise on the fifteenth day and a peak of 888,000 in one month, but the number fell to 528,000 within two months. A boy 1 year old showed no rise until four months after operation.

The patients became more and more anemic and did not show lymphocytosis. Nucleated red cells in the peripheral blood increased in number throughout the period of postoperative life. Thus this group differs from all the others in progressive anemia, increased number of nucleated red cells (sometimes twenty times as many as the total number of leukocytes), lack of lymphocytosis and irregular rise in the number of platelets, which was absent in some, appeared early in some and was

delayed for several weeks or months in others, and which never endured more than a few days or weeks (table 4).

Hemorrhagic Thrombocytopenia (Purpura Haemorrhagica).—Eight cases of splenectomy for hemorrhagic thrombocytopenia were available for this study, and all but one have been reported in the paper by McLean, Caffey and Kreidel.[4] All the children had very low platelet counts (10,000 to 34,000 per cubic millimeter) before operation, and all but one (L. K.) showed a rise within one hour after the spleen was

TABLE 4.—*Blood Picture Following Splenectomy for Cooley's Anemia in a Patient (G. G.) One Year Old*

Time After Operation	Date	Hemoglobin, Gm.	Hemoglobin, per Cent	Red Blood Cells	Platelets	White Blood Cells	Polymorphonuclears	Lymphocytes	Monocytes	Eosinophils	Myeloblasts	Nucleated Red Myelocytes	Blood Cells	Reticulocytes
	2/17/31	8.5	50	3,328,000	472,000	8,950	44	55	5	..	..	..	150	0.8
	4/29/31	5.9	35	1,936,000	328,000	10,700	50	33	11	2	2	3	9,850	4.4
	5/ 7/31	5.9	35	2,496,000	352,000	12,970	46	40	1	6	4	2	13,840	4.4
	(transfusion)													
	5/29/31	9.8	58	3,912,000	384,000	10,620	62	32	4	2	..	..	4,780	3.3
	6/ 2/31 (splenectomy)													
3 hours	6/ 2/31	12.7	75	4,000,000	576,000	18,330	57	23	8	4	2	6	12,620	5.9
1 day	6/ 3/31	12.7	75	3,976,000	584,000	6,740	69	17	10	1	2	1	17,000	
6 days	6/ 8/31	12.7	75	3,804,000	872,000	10,420	66	29	..	4	1	..	3,230	
11 days	6/13/31	13.2	78	3,888,000	920,000	17,250	55	36	5	3	..	..	750	0.4
16 days	6/18/31	12.7	75	3,856,000	960,000	14,050	60	24	10	6	..	..	650	0.2
24 days	6/26/31	12.7	75	3,688,000	720,000	10,960	57	29	8	5	..	1	3,290	0.7
35 days	7/ 7/31	11.3	67	3,376,000	544,000	9,250	42	50	3	5	..	..	4,800	1.6
4 months	10/ 5/31	6.8	40	2,232,000	640,000	9,820	43	40	17	..	..	..	42,000	
8 months	2/12/32	6.4	38	1,984,000	612,000	12,800	58	32	..	7	..	..	36,000	5.3
1 year	6/22/32	6.4	38	2,288,000	456,000	9,700	47	47	2	2	..	..	37,550	4.8
1½ years	1/18/33	6.8	40	2,204,000	640,000	12,800	41	52	1	3	..	..	41,450	
2 years	6/ 7/33	6.8	40	1,936,000	512,000	9,400	45	45	2	2	..	..	27,100	3.1
2½ years	1/ 3/34	7.5	45	2,264,000	568,000	11,600	66	30	1	2	..	..	36,900	8.0
3½ years	3/13/35	5.6	33	2,032,000	768,000	14,900	77	21	..	2	..	..	45,300	8.8

removed. In one boy (A. S.) the initial rise did not continue, and he died of a cerebral hemorrhage three weeks after splenectomy. L. K. showed a slight rise at three and five hours, but after two weeks only 72,000 platelets were present, and he was discharged after seven weeks with a count of 48,000 per cubic millimeter. Six months after operation his blood contained 616,000 platelets per cubic millimeter and three weeks later, 40,000. Since then, for two and one-half years, his platelet count has fluctuated between 64,000 and 300,000. He has had no hemorrhage, however (figure).

4. McLean, S.; Caffey, J. P., and Kreidel, K. V.: Hemorrhagic Thrombocytopenia in Childhood, J. A. M. A. **98**:387 (Jan. 30) 1932.

In the other six children the number of platelets reached 1,000,000 in from three to ten days and maintained this level for from six to twelve days; in one case, the high level, with remissions, was maintained for three and one-half months (table 5).

The highest number of platelets per cubic millimeter developed in a 10 year old boy (H. T.) on the ninth postoperative day; but the count dropped to 1,264,000 eleven days later and then rapidly to 104,000 in the next two weeks. The latest count, two and one-half months after splenectomy, showed 448,000 platelets per cubic millimeter.

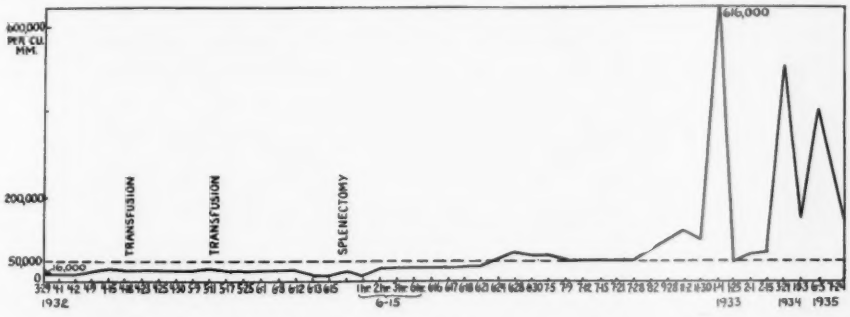

Figure showing the level of blood platelets in a patient with hemorrhagic thrombocytopenia and the atypical response to splenectomy.

TABLE 5.—*Blood Picture Following Splenectomy for Hemorrhagic Thrombocytopenia in a Patient (J. T.) Four Years and Ten Months Old*

Time After Operation	Date	Hemoglobin		Red Blood Cells	Platelets	White Blood Cells	Polymorphonuclears	Lymphocytes	Monocytes	Eosinophils	
		Gm.	Per Cent								
	2/ 9/31 (transfusion)	10.2	60	2,840,000	20,000	13,350	82	17	..	1	(bleeding time 15 min. +)
	2/ 9/31 (splenectomy)	14.4	85	3,968,000	22,000	13,300	88	11	1		
1½ hours	.....	11.9	70	3,024,000	98,000	20,950	75	21	1		(3 myelocytes)
2½ hours	.....	....	..	.....	130,000	19,200	87	12	..		(1 myelocyte)
9½ hours	.....	11.9	70	3,064,000	272,000	19,100	84	14	..		(2 myelocytes)
19 hours	.....	11.9	70	2,984,000	440,000	20,000	81	17	1		(1 myelocyte)
40 hours	.....	10.2	60	2,688,000	624,000	31,400	86	13	1		(1 normoblast)
64 hours	.....	9.3	55	2,904,000	684,000	20,200	82	17	..		(3 normoblasts)
4 days	2/12/31	9.3	55	2,784,000	704,000	15,500	82	16			
5 days	2/15/31	9.3	55	2,904,000	832,000	20,050	89	9	..	2	
7 days	2/17/31	9.3	55	2,434,000	1,256,000	19,080	71	28	1		
8 days	2/18/31	9.3	55	2,456,000	1,304,000	24,400	72	26	1	1	
12 days	2/22/31	10.2	60	2,992,000	1,304,000	7,550	84	15	1		
18 days	2/28/31	11.0	65	2,752,000	1,184,000	13,550	78	22			
23 days	3/ 4/31	11.9	70	3,460,000	856,000	13,800	75	23	1	1	
2 months	4/15/31	12.7	75	3,832,000	600,000	9,300	45	44	5	6	
8½ months	10/28/31	14.5	85	4,726,000	752,000	8,000	51	42	3	4	
1 year	9/17/32	15.2	89	4,092,000	728,000	10,500	50	48	..	2	
2¼ years	5/ 3/33	13.9	82	3,736,000	720,000	10,500	61	38	..	1	
2 yr., 8 mo.	10/25/33	14.4	85	5,000,000	580,000	14,700	30	65	3	1	
3 yr., 4 mo.	6/ 6/34	13.7	81	4,364,000	600,000	11,200	31	64	..	5	
4 years	1/ 9/35	13.6	80	4,592,000	848,000	10,300	46	52	..	2	

An interesting feature of this group is the number of platelets found in pulp aspirated from the spleen immediately after its removal. The counts are given in table 6.

The child who had the highest number of platelets in the spleen immediately after its removal showed no appreciable rise of platelets in the circulating blood after splenectomy and died of cerebral hemorrhage three weeks later. That this may be interpreted as indicating destruction of the platelets in the spleen is possible but not proved. The smallest number of intrasplenic platelets occurred in a boy who has shown a normal number of platelets in his blood for only a short time during three postoperative years. While the counts have been below normal most of that time, he has had no bleeding and is well. It seems fair to assume that his marrow is inefficient in the formation of platelets. There

TABLE 6.—*Blood Platelets in Splenic Pulp at Time of Removal in Cases of Hemorrhagic Thrombocytopenia*

Patient	Sex	Platelets		Rise to:	Comment
		In Spleen	In Blood		
A. S.	Boy	864,000	20,000	40,000	Died in 3 weeks of cerebral hemorrhage
N. V.	Girl	60,000	12,000	1,072,000	Well for 16 months; then died of pneumococcic meningitis
H. H.	Boy	232,000	22,000	1,760,000	Well for three and one-half years
B. G.	Boy	626,000	16,000	2,120,000	Hemorrhagic episode after 4 years; well for 5 years and 7 months after splenectomy
J. T.	Boy	432,000	22,000	1,304,000	Well for 4 years and 4 months
L. K.	Boy	44,000	22,000	64,000 to 350,000 for 2½ years; 656,000 for 3 weeks	Well for 3 years
H. T.	Boy	232,000	26,000	2,456,000	Fall in platelet level to 104,000 in 5 weeks; well

is no parallel between the number of platelets per cubic millimeter in the spleen at the time of removal and the subsequent rise in the blood or between the peak of the postoperative platelet curve and the recurrence of bleeding. The two highest peaks were associated with the two lowest drops, one after four weeks and one after four years. In fact, no definite prognosis can be given in this group of cases except to say that 80 per cent of the children recover after the operation and that about 85 per cent show a postoperative platelet crisis and live for years. Whether or not the hemorrhagic episodes will return cannot be predicted even after a normal course of four years. Therefore, the final outcome remains a problem and a gamble. The next to the highest count was 2,120,000 platelets per cubic millimeter, in a 5 year old boy who had a hemorrhagic episode with bleeding from the gums and into the skin four years after splenectomy. At this time the platelets reached a level of 96,000, but the number rose within six days to 424,000 without any treatment. After nine days the count had fallen

again to 46,000 with the appearance of a fresh bruise on the skin. A spontaneous rise to 424,000 occurred within a month and to 696,000 within a year. Data on the six patients still alive are given in table 7.

The patients in this group were not anemic. All but one (B. G.) showed a higher percentage of lymphocytes than is normal for their age, and the proportion of eosinophils increased in three. M. A. had 23 nucleated red cells per hundred leukocytes in the smear taken on

TABLE 7.—*Blood Picture Following Splenectomy for Hemorrhagic Thrombocytopenia*

	Age, Yr.	Post-operative Interval	Platelets	Hemoglobin, per Cent	Platelets in Spleen at Operation	White Blood Cells	Polymorphonuclears	Lymphocytes	Monocytes	Eosinophils	Blood Coagulation Time
M. A.	15	8 yr.	672,000	97	.....	6,950	45	55	..	..	Normal
H. H.	15	3 yr.	400,000	100	232,000	7,900	39	49	1	9	Normal
J. T.	9	4 yr.	848,000	82	432,000	10,300	46	52	0	2	Normal
B. G.	10	5 yr.	552,000	100	626,000	8,600	70	26	0	4	Normal
L. K.	14	3 yr.	408,000	90	44,000	8,250	49	41	0	10	Normal
H. T.	10	5 wk.	104,000	65	232,000	7,230	72	16	7	1	Normal

TABLE 8.—*Blood Picture Following Nephrectomy for Tuberculous Kidney in a Patient (M. S.) Eleven Years and One Month Old Used as a Control*

Time After Operation	Date	Hemoglobin		Red Blood Cells	Platelets	White Blood Cells	Polymorphonuclears (Schilling)	Lymphocytes	Monocytes	Eosinophils
		Gm.	Per Cent							
	11/ 9/32	14.7	87	4,608,000	784,000	6,340	83 (3-57-23)	9	3	3
	11/10/32 (nephrectomy)									
1 day	11/11/32	13.6	80	4,072,000	720,000	10,600	83 (3-56-24)	12	4	(1 myeloblast)
2 days	11/12/32	....	..	4,772,000	720,000					
4 days	11/14/32	15.3	90	4,256,000	744,000	6,350	75 (3-38-34)	17	3	5
5 days	11/15/32	15.3	90	4,552,000	696,000	6,050	82 (3-44-35)	13	2	3
7 days	11/17/32	13.2	72	4,072,000	768,000					
9 days	11/19/32	13.6	80	3,864,000	768,000					
11 days	11/21/32	13.6	80	4,032,000	856,000	5,700	79 (3-35-29)	18	1	2
12 days	11/22/32	13.9	82	4,600,000	760,000					
18 days	11/28/32	14.4	85	4,528,000	872,000	7,300	70 (3-37-30)	21	1	7 (and 1 basophil)

the second postoperative day and none after the seventh day. B. G. had 14 normoblasts in the smear from his blood on the second day, 10 on the third, and none thereafter. J. T. had 1 on the first day, 2 on the second, 3 on the third, 1 on the fifth, 2 on the tenth, and none thereafter. The appearance of normoblasts is usual on the second day, but the number is small as a rule and the duration short.

CONTROLS

As controls we had (1) a girl 11 years old on whom a nephrectomy had been done for tuberculosis of the kidney; (2) a boy 5 years old who had been subjected to nephropexy and ureterotomy; (3) a girl

22 months old who had had an exploratory laparotomy for abdominal teratoma, and (4) a boy 15 months old on whom herniorrhaphy had been performed. None of these four children showed an appreciable rise in the platelet count during the postoperative period of hospitalization or during the two months following discharge (table 8).

SUMMARY

In forty-four children the blood picture following splenectomy varied with the cause for the removal of the spleen.

When there had been no preoperative diminution in the number of platelets, as in cases of traumatic rupture, rheumatic disease and congenital hemolytic icterus, there was no immediate increase after the operation; but an increase appeared toward the middle or end of the first week, rarely before the third day.

In cases of hemorrhagic thrombocytopenia, in which the number of platelets had been much diminished, splenectomy was followed by an immediate rise in all but one instance. This rise was not maintained in a fatal case and was delayed in the case of a boy who has lived two and one-half years after operation. The peak was reached, as a rule, in the second postoperative week, and a level of 1,000,000 platelets per cubic millimeter was maintained for a week or for several months.

A fall in the reticulocyte count was characteristic of typical cases of congenital hemolytic icterus.

In patients with Cooley's anemia, the response of the platelets was most irregular in onset, number and duration of the increase, nor was it ever as high or of as long duration as in the other groups. Increase in the number of nucleated red cells is characteristic in these cases.

Operations other than splenectomy were not followed by any appreciable rise in the platelet count during the postoperative period of observation.

VALUES FOR RED BLOOD CELLS OF AVERAGE INFANTS AND CHILDREN

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The determination of the amount of hemoglobin and the number of red cells in the venous blood of normal persons has occupied the attention of investigators for many years. More recently the estimation of the volume of packed cells has been an added procedure. Most of the observations have been limited to adults, with the result that information regarding the range of values in the blood of infants and children is relatively incomplete. Since alteration in the normal values serves as a basis for the laboratory diagnosis of the various kinds of anemia, practical significance is given to the establishment of the boundaries of the normal range. We have recently reported the blood values which we obtained on a series of normal adults.[1]

The present study has been made on a group of 533 children of both sexes, ranging in age from birth to 13 years. The amount of hemoglobin, the number of red blood cells and the volume of packed cells have been determined with accuracy. The data obtained together with values for the individual corpuscle are compared with similar values for the group of adults of both sexes. Both children and adults live in the same region at an altitude of approximately 5,000 feet.

REVIEW OF THE LITERATURE

The literature contains a number of reports of values for venous blood of normal adults which have been summarized in part by us in a recent paper.[1] Only a few scattered observations on infants and children are available. Most of the data for children consist of estimations of the amount of hemoglobin, or of the hemoglobin content and the number of red cells, in peripheral blood, without any consideration of the volume of packed cells. Previous reports are concerned chiefly with new-born infants and with children under 2 years of age, because

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1. Andresen, M. I., and Mugrage, E. R.: Red Blood Cell Values for Normal Men and Women, Arch. Int. Med., to be published.

it is in this period that the most striking variations in blood values appear. As long ago as 1878 Leichtenstern [2] commented on the high average amounts of hemoglobin found at birth and the rapid decrease during early infancy. Among the investigators who have verified this observation are Williamson,[3] Appleton,[4] Drucker,[5] Mackay,[6] Elvehjem, Peterson, and Mendenhall,[7] Kato and Emery [8] and Merritt and Davidson.[9] Most of these results on peripheral blood seem to show that the hemoglobin value reaches a low level at about the third or fourth month of life and that there is a slight transient rise at about the sixth month but no appreciable increase during the first two years.

Only two of these investigations were carried beyond the second year of life. Williamson's [3] comprehensive study of the peripheral blood of 919 persons of all ages has been criticized because of the standard of recrystallized hemoglobin which he used. His values may be too high, but the general nature of the curve which he obtained for hemoglobin is significant. The low point is reached at the end of the first year. From that age there is a gradual increase to the adult level at 20 years. Elvehjem, Peterson and Mendenhall [7] followed a group of 750 children from birth to the age of 5 years. They found that in their series the average hemoglobin value for peripheral blood at birth was 22 Gm.; this fell rapidly to 11.7 Gm. at the age of 2 months and remained between 11 and 12 Gm. until the age of 2½ years, when it increased slightly.

The more important observations on the number of red blood cells at birth and in the first year of life are summarized in Merritt and Davidson's [9] report. These observations showed a high average for the number of red blood cells at birth, with a range between 5,000,000 and 8,000,000. Merritt and Davidson's mean figure of 5,950,000 agreed with most of the previous averages. They found in their series of 73 infants that after an initial adjustment period of two months the

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2. Leichtenstern, O., quoted by Mitchell.[15]

3. Williamson, C. S.: Influence of Age and Sex on Hemoglobin, Arch. Int. Med. **18**:505 (Oct.) 1916.

4. Appleton, V. B.: Determination of Hemoglobin During Infancy by the Palmer and Van Slyke Methods, J. Biol. Chem. **34**:369 (May) 1918.

5. Drucker, P.: Investigations on the Normal Values for the Haemoglobin and Cell Volume in the Small Child, Acta pædiat. **3**:1, 1923.

6. Mackay, H. M. M.: The Normal Hemoglobin Level During the First Year of Life: Revised Figures, Arch. Dis. Childhood **8**:221 (June) 1933.

7. Elvehjem, C. A.; Peterson, W. H., and Mendenhall, D. R.: Hemoglobin Content of the Blood of Infants, Am. J. Dis. Child. **46**:105 (July) 1933.

8. Kato, K., and Emery, O. J.: Hemoglobin Content of the Blood in Infancy, Folia haemat. **49**:106 (Jan.) 1933.

9. Merritt, K. K., and Davidson, L. T.: The Blood During the First Year of Life, Am. J. Dis. Child. **46**:990 (Nov.) 1933.

red blood cells remained at a level of about 4,690,000 and the hemoglobin at approximately 12.6 Gm. throughout the remainder of the first year.

Reports on the number of red blood cells in children of all ages are not numerous. Averages were given by Lucas and Washburn [10] as ranging between 4,000,000 and 5,000,000 for children under 2 years of age and as approximately 5,000,000 for older children. Mayers' [11] figures of 7,600,000 red blood cells in the peripheral blood at birth, 5,790,000 at 10 days of age, 5,850,000 at 1 year, 5,750,000 at two years and 5,210,000 between the ages of 5 and 10 years are somewhat higher than the generally accepted values. Wilke [12] found in 242 German children between the ages of 1 and 14 years that the highest level, 14.82 Gm., of hemoglobin was present between the ages of 1 and 2 years, with the lowest average, 12.78 Gm., in the fifth year. The averages for the group from this age to the fourteenth year were between 13 and 14 Gm. In the older groups the girls showed slightly lower hemoglobin values than the boys. The highest average for the red blood cell count, 5,480,000, was found between the ages of 1 and 2 years. The average dropped to 3,760,000 in the fifth year but was higher in older children, varying in different age groups between 3,910,000 and 4,360,000.

Color, saturation and volume indexes have been generally used to determine the relationship between the hemoglobin content, the number of red blood cells and the volume of packed cells. These indexes require the use of arbitrary normal standards, which are not universal but which must be determined for the particular age and sex of the subjects under study.

In order to avoid the necessity for such standards, Wintrobe [13] proposed the use of absolute values for the individual red blood cells, which he termed the corpuscular constants.

1. The mean corpuscular hemoglobin content is the average amount by weight of hemoglobin in the individual red blood cell expressed in micromicrograms, or grams $+ 10^{-12}$. It is obtained by dividing the hemoglobin content in grams per thousand cubic centimeters of blood by the red blood cell count in millions per cubic millimeter.

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10. Lucas, W. P., and Washburn, A. H.: Diseases of the Blood and Blood-Building Organs, in Clinical Pediatrics, New York, D. Appleton & Company, 1926, vol. 11, p. 38.

11. Mayers, L. H.: A Study of the Erythrocyte Curve at Various Ages and Its Relationship to Hemoglobin Curve, Arch. Int. Med. **30**:478 (Oct.) 1922.

12. Wilke, E.: Über den Gehalt des Blutes gesunder Kinder vom zweiten bis vierzehnten Lebensjahr an roten Blutkörperchen, an Blutfarbstoff, an Retikulocyten und an Thrombocyten, Folia haemat. **52**:291 (Sept.) 1934.

13. Wintrobe, M. M.: The Volume and Hemoglobin Content of the Red Blood Corpuscle, Am. J. M. Sc. **177**:513 (April) 1929.

2. The mean corpuscular volume in cubic microns, or cubic centimeters $\times 10^{-12}$, represents the volume of the individual cell and is obtained by dividing the volume of packed red blood cells in cubic centimeters per thousand cubic centimeters of blood by the red blood cell count in millions per cubic millimeter.

3. The mean corpuscular hemoglobin concentration in percentage, or the average concentration of hemoglobin in the cell, is obtained by dividing the hemoglobin content in grams per hundred cubic centimeters of blood by the volume of packed cells in cubic centimeters per hundred cubic centimeters of blood.

The results of our recent investigations [1] are in agreement with Wintrobe's [14] observations that in normal adults the mean volume and hemoglobin concentration are confined within relatively narrow limits. Any marked alteration in corpuscular volume or decrease in corpuscular hemoglobin concentration he considered as indicative of anemia.

The values for mean corpuscular volume which mark the limits of normal for adults cannot be applied to young infants, as the red blood cells at birth have been found to be increased in volume. From data reported by Mitchell [15] on the peripheral blood of 69 infants, the average corpuscular volume on the first day of life was 109 cubic microns; by the tenth day it was 104 cubic microns. The studies of blood volume made by Lucas and Dearing [16] on 30 infants from 2½ hours to 15 days of age showed an average corpuscular volume for venous blood of 108 cubic microns. Van Creveld,[17] by means of measure of diameters, found that the size of the red blood cells was decreased to approximately that of adults about six weeks after birth.

Guest's [18] recent studies are of interest because of the differences which he has found in corpuscular volume and to a lesser degree in corpuscular hemoglobin concentration at various age levels. Some representative figures from the data for his series of more than 50 adults, 150 children and 25 infants at birth are given in table 1. He has found a progressive decrease in the size of the red blood corpuscles from a volume at birth considerably larger than the average found in older children to a volume after the sixth month of life which is considerably smaller.

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14. Wintrobe, M. M.: Anemia: Classification and Treatment on the Basis of Differences in Average Volume and Hemoglobin Content of Red Corpuscles, Arch. Int. Med. **54**:256 (Aug.) 1934.

15. Mitchell, J. M.: Relationship of Jaundice and Weight to Blood Values in the New-Born Infant, Am. J. Dis. Child. **38**:518 (Sept.) 1929.

16. Lucas, W. P., and Dearing, B. F.: Blood Volume in Infants Estimated by the Vital Dye Method, Am. J. Dis. Child. **21**:96 (Jan.) 1921.

17. Van Creveld, S.: Diameter of Red Blood Cells of Premature Infants and of Those Born at Full Term, Am. J. Dis. Child. **44**:701 (Oct.) 1932.

18. Guest, E.: Personal communication to the authors.

While the volume of the red blood cell at birth is larger than in adult life, the amount of hemoglobin is also greater, so that the concentration is maintained at practically the same level as in the cells of adults. Haden and Neff [19] demonstrated this in 1924, using blood from the sinuses of 11 infants ranging in age from birth to 24 days. Their data give values for mean corpuscular hemoglobin and volume much higher than those for the adults of their series, but the mean corpuscular hemoglobin concentration, 32 per cent, is almost the same as that for the adults. The mean corpuscular hemoglobin concentration of the infants under 1 year of age in Bakwin and Rivkin's [20] series was 31.5 per cent.

Drucker [5] reported values in his series of determinations of peripheral blood on 85 Danish children under 2 years of age which showed that the concentration of hemoglobin reached a low level of 28.7 per cent at about the age of 9 months. He stated that this lowering of the

TABLE 1.—*Values for Red Blood Cells* *

	Number	Hemoglobin, Gm. per 100 Cc.	Red Blood Cells, Millions per Cu. Mm.	Volume of Packed Cells, Cc. per 100 Cc.	Mean Corpuscular Hemoglobin Content	Mean Corpuscular Volume	Mean Corpuscular Hemoglobin Concentration
Blood of the cord.....	6	17.19	4.65	51.8	37.1	111.5	33.2
Normal children from 3 to 12 years of age..	6	13.54	4.65	39.2	29.2	84.4	34.6
Men.....	1	16.00	5.34	46.9	30.0	87.9	34.1
Women.....	1	12.17	3.85	35.6	31.6	92.5	34.2

* From Guest.[18]

concentration is evidence of a physiologic chlorosis of the small child, which, in his opinion is terminated at about the age of puberty. Guest's normal infants showed some decrease in this value between the sixth and the ninth month of life, but the concentration of hemoglobin in the blood of older children was about the same as in that of the adults of his series.

The work recently reported by Osgood and Baker [21] furnishes the most comprehensive data available on older children. In 215 children from 4 to 13 years of age they found an average of 5,040,000 red blood cells, an

19. Haden, R. L., and Neff, F. C.: The Volume Index and Color Index of the Red Blood Corpuscles in New-Born Infants, Am. J. Dis. Child. **28**:458 (Oct.) 1924.

20. Bakwin, H., and Rivkin, H.: The Estimation of the Volume of Blood in Normal Infants and in Infants with Severe Malnutrition, Am. J. Dis. Child. **27**:340 (April) 1924.

21. Osgood, E. E., and Baker, R. L.: Erythrocyte, Hemoglobin, Cell Volume and Color, Volume and Saturation Index Standards for Normal Children of School Age, Am. J. Dis. Child. **50**:343 (Aug.) 1935.

average hemoglobin content of 11.9 Gm. and an average volume of packed cells of 37.28 cc.[22] From these figures the mean corpuscular hemoglobin content is 23.6 micromicrograms, the mean corpuscular volume is 73.9 cubic microns and the mean corpuscular hemoglobin concentration is 31.9 per cent. The first two values are considerably lower than those for the adults of the series.

This brief review of the literature is sufficient to indicate that there are differences in blood values not only between adults and children but also between children of different ages. In addition, variations between children of the same age are to be expected. A correct evaluation of these differences may be obtained (*a*) by following individual children through the years of their development and (*b*) by investigation of the blood of a large number of children of various ages. Only the second method was used in the present study.

SUBJECTS

Specimens of blood from the umbilical cord were obtained from 40 normal full term infants in the obstetric service of the Colorado General Hospital. All of the mothers were apparently in good health during pregnancy and at the time of delivery. Blood was collected by severing the cord before pulsations had ceased.

In the group of infants under 2 years of age, 40 under 6 months and 6 between 6 months and 1 year were healthy babies in the Florence Crittendon and Salvation Army nurseries. These infants were fed a modified milk formula. Cod liver oil and orange juice were added at about 2 months and cereal and vegetables at 6 months. The other 77 members of the group, with the exception of 6 in the hospital, were healthy babies attending the Infant Welfare clinic of the Visiting Nurse Association. At this clinic the babies are weighed at each visit, and dietary instructions are given to the mothers by the physicians in charge. Visits to the homes are made regularly by a visiting nurse, who stresses health habits and renders nursing service when the babies are ill. Only a few of these infants were entirely breast fed. Most of them received a diet of modified fresh milk or evaporated milk. Cod liver oil and orange or lemon juice were ordered the second or third month, vegetables and cereals at the fifth or sixth month, fruit at about the eighth month and meat at about the fifteenth month. Egg yolk was added early in some cases but was not given as a routine. None of the babies received any iron or copper medication. No effort was made to eliminate from the group any infants with previous illnesses who showed complete recovery at the time the sample of blood was taken. On a few babies of the series from the Florence Crittendon home several determinations were made at intervals of three or four weeks, bringing the total number of samples from children under 2 years of age to 138.

Of the children over 2 years of age, 8 in the group between 2 and 3 years were attending the clinic of the Visiting Nurse Association, and 225 were selected from those admitted to the outpatient clinic and the pediatric ward of the Colorado

22. A correction of 3.5 per cent for shrinkage produced by the anticoagulant has been made according to the suggestion of Dr. E. E. Osgood in a personal communication.

General Hospital. In general, the ailments were minor, such as are frequently encountered in any large group of children; those who were hospitalized were almost all children who required surgical and orthopedic treatment. Many of the hospitalized patients were from rural and village homes in Colorado, and the majority of the patients who came to the clinic were residents of Denver. One hundred and thirty-seven of the series comprised an institutional group from the State Home for Dependent Children, where they had been resident for from a few weeks to several years. Living conditions and diet in this institution are entirely satisfactory, and the health of the children is closely supervised. The entire series included 8 Negroes, 9 Mexicans and 1 Indian; the remainder were white children of composite nationalities.

While a group carefully selected on the basis of freedom from previous illness might be found to show higher blood values, the range of values here reported probably represents the usual findings in groups of average children.

METHODS

There appears to be some lack of agreement between the values for red blood cells and hemoglobin in sinus blood and those in peripheral blood of the newborn infant.[23] Venous and peripheral blood of older subjects are, however, usually considered to be equivalent when care is used in obtaining samples from both sources.[24] Since the more accurate methods require the use of blood in amounts which can be obtained only by venipuncture, samples secured from an external jugular vein of the young infants and from a cubital vein of the older children were used in the present study. Care was taken to avoid undue stasis. Potassium oxalate was generally employed as the anticoagulant, but heparin was occasionally substituted. When sufficient blood could be obtained, hemoglobin was determined by three methods: the Van Slyke-Neill[25] manometric measurement of oxygen capacity; the determination of the iron content of the whole blood[1] and the Osgood-Haskins[26] acid hematin method. Only the hemoglobin values obtained from the oxygen capacity method are used in this report.

Wintrobe[27] hematocrit tubes were used for determining the volume of packed cells, and a correction of 6.4 per cent for shrinkage was made on the oxalated samples. Red blood cell counts were made on at least two dilutions from each sample of blood, and the average of two counts differing by less than 200,000 cells was taken as the value for the sample. Details of methods and

23. Haden and Neff.[19] Lucas, W. P.; Dearing, B. F.; Hoobler, H. R.; Cox, A.; Jones, M. R., and Smyth, F. S.: Blood Studies in the New-Born, Am. J. Dis. Child. **22**:525 (Dec.) 1921.

24. (*a*) Osgood, E. E., and Haskins, H. D.: Laboratory Diagnosis, Philadelphia, P. Blakiston's Son & Co., 1931, p. 345. (*b*) Wintrobe, M. M., and Miller, M. W.: Normal Blood Determinations in the South, Arch. Int. Med. **43**:96 (Jan.) 1929.

25. Van Slyke, D. D., and Neill, J. M.: The Determination of Gases in Blood and Other Solutions by Vacuum Extraction and Manometric Measurement, J. Biol. Chem. **61**:523 (Sept.) 1924.

26. Osgood, E. E., and Haskins, H. D.: A New Permanent Standard for Estimation of Hemoglobin by the Acid Hematin Method, J. Biol. Chem. **57**:107 (Aug.) 1923.

27. Wintrobe, M. M.: A Simple and Accurate Hematocrit, J. Lab. & Clin. Med. **15**:287 (Dec.) 1929.

calculations [28] are the same as in the previously reported study [1] on the blood of adults.

The work was continued over a period of almost two years; so possible seasonal variations need not be considered.

RESULTS AND COMMENT

For study of the results the children are divided into eighteen age groups. The separate averages for hemoglobin for the two sexes are given in table 2. Although the values are not identical in most of the age groups, the differences are generally so small that they are probably not significant. The results for both sexes in each age group are therefore averaged together. The infants under 2 years of age are divided into six groups in order to show the fluctuations in blood values which occur in the first months of life.

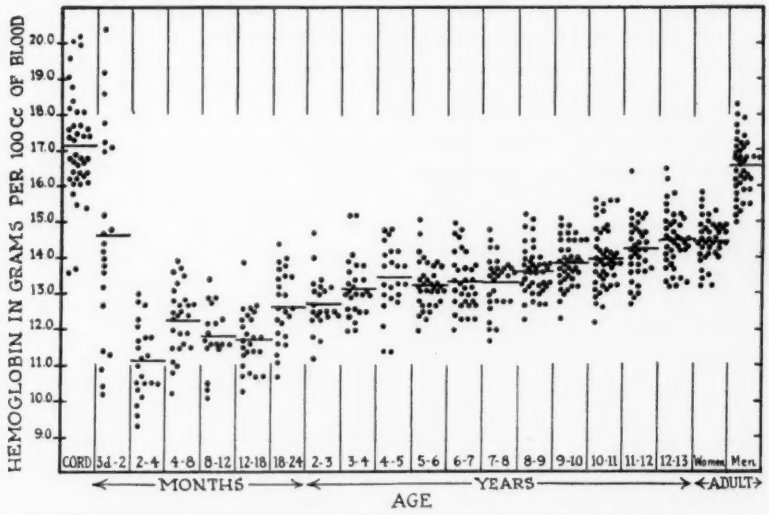

Chart 1.—Distribution of results of 628 hemoglobin determinations on venous blood by the Van Slyke-Neill oxygen-capacity method. The horizontal lines represent the mean values.

The mean hemoglobin values are given in table 3, and the distribution of individual determinations is represented in chart 1.

The highest mean hemoglobin level, 17.14±0.16 Gm., is found for the blood of the cord. The low mean value, 11.14 ± 0.15 Gm., occurs

28. Calculations of statistical data are in frequency groups as suggested by Dunn (Application of Statistical Methods in Physiology, Physiol. Rev. **9**:341 [April] 1929). The size of the class units is stated at the foot of each table. In charts 1 and 3 the unit of the scale is double the class unit used in computation of statistical data for the hemoglobin content and the volume of packed cells. In charts 2, 4, 5 and 6 the units of the scale are the same as the class units used in computation of the statistical data.

between the ages of 2 and 4 months. The babies between the ages of 4 and 8 months show an increase to a mean of 12.29 ± 0.12 Gm., but lower values are again found in the period between the eighth and the

TABLE 2.—*Mean Hemoglobin Values According to Age and Sex*

Age	Number of Boys	Hemoglobin, Gm. per 100 Cc.	Number of Girls	Hemoglobin, Gm. per 100 Cc.
At birth (blood taken from the cord)	20	17.02	20	17.26
3 days to 2 months	14	13.55	8	16.55
2 to 4 months	12	10.91	10	11.41
4 to 8 months	13	11.96	14	12.60
8 to 12 months	4	11.82	14	11.80
12 to 18 months	14	11.60	11	11.91
18 to 24 months	13	12.66	11	12.66
2 to 3 years	11	12.73	11	12.73
3 to 4 years	15	13.07	11	13.33
4 to 5 years	15	13.59	8	13.33
5 to 6 years	23	13.38	11	13.05
6 to 7 years	14	13.35	19	13.33
7 to 8 years	18	13.69	11	13.67
8 to 9 years	21	13.54	20	13.75
9 to 10 years	15	13.84	24	13.89
10 to 11 years	26	14.26	21	13.66
11 to 12 years	17	14.38	19	14.07
12 to 13 years	25	14.53	15	14.42
Total	290		258	

TABLE 3.—*Statistical Data for Hemoglobin, Red Blood Cells and Volume of Packed Cells*

Number of Determinations	Age of Patient	Hemoglobin* Mean	Hemoglobin* Standard Deviation	Hemoglobin* Probable Error of Mean	Hemoglobin* Coefficient of Variation, %	Red Blood Cells† Mean	Red Blood Cells† Standard Deviation	Red Blood Cells† Probable Error of Mean	Red Blood Cells† Coefficient of Variation, %	Volume of Packed Cells‡ Mean	Volume of Packed Cells‡ Standard Deviation	Volume of Packed Cells‡ Probable Error of Mean	Volume of Packed Cells‡ Coefficient of Variation, %
40	At birth (blood taken from the cord)	17.14	1.46	0.16	8.6	4.86	0.41	0.04	8.3	53.18	4.72	0.50	8.8
22	3 days-2 months	14.64	2.86	0.41	19.5	4.22	0.66	0.09	15.5	43.28	9.14	1.31	21.1
22	2-4 months	11.14	1.04	0.15	9.3	3.90	0.40	0.06	10.3	34.18	2.85	0.41	8.3
27	4-8 months	12.29	0.91	0.12	7.4	4.23	0.30	0.04	7.0	37.37	2.55	0.33	6.8
18	8-12 months	11.81	0.65	0.10	5.4	4.28	0.22	0.04	5.1	36.81	1.42	0.23	3.8
25	12-18 months	11.73	0.83	0.11	7.0	4.25	0.19	0.03	4.4	36.28	2.24	0.30	6.1
24	18-24 months	12.66	0.99	0.14	7.8	4.31	0.17	0.02	3.9	38.28	2.07	0.28	5.4
22	2-3 years	12.73	0.78	0.11	6.1	4.36	0.21	0.03	4.7	38.51	2.24	0.32	5.8
26	3-4 years	13.18	0.76	0.10	5.7	4.44	0.25	0.03	5.5	39.61	2.59	0.34	6.5
23	4-5 years	13.43	0.97	0.14	7.2	4.43	0.21	0.03	4.8	40.10	2.47	0.35	6.1
34	5-6 years	13.27	0.65	0.08	4.9	4.40	0.20	0.02	4.6	39.93	2.08	0.24	5.1
33	6-7 years	13.34	0.80	0.09	5.9	4.41	0.22	0.03	5.0	39.87	2.09	0.25	5.2
29	7-8 years	13.33	0.66	0.08	4.9	4.37	0.15	0.02	3.4	39.77	2.02	0.26	5.0
41	8-9 years	13.64	0.68	0.07	4.9	4.44	0.21	0.02	4.8	40.90	1.69	0.18	4.1
39	9-10 years	13.87	0.67	0.07	4.8	4.49	0.22	0.02	5.0	41.23	1.84	0.20	4.4
47	10-11 years	13.99	0.85	0.08	6.0	4.54	0.25	0.02	5.4	41.70	2.32	0.23	5.5
36	11-12 years	14.22	0.78	0.09	5.4	4.58	0.24	0.03	5.1	42.30	2.28	0.26	5.3
40	12-13 years	14.49	0.85	0.09	5.8	4.66	0.22	0.02	4.6	43.15	1.83	0.20	4.2
40	Women	14.45	0.69	0.07	4.7	4.63	0.15	0.02	3.3	43.22	1.80	0.19	4.1
40	Men	16.54	0.81	0.09	4.8	5.42	0.25	0.03	4.6	48.35	2.17	0.23	4.4

* The class unit used in group computation of statistical data is 0.5 Gm.[28]
† The class unit used is 0.2 million.
‡ The class unit used is 1 cubic centimeter.

eighteenth month, with the low mean of 11.73 ± 0.11 Gm. occurring between the twelfth and the eighteenth month. Beginning at the age of 18 months there is a gradual increase to the mean of 14.49 ± 0.09

Gm. at 12 years, which is very close to the mean value of 14.45 ± 0.07 Gm. obtained by us for the series of normal women. The differences in averages between the clinic and the hospital group and the group from the State Home as shown in table 4 are not especially striking. The hemoglobin averages for the children in the State Home are higher than those for the other group in only two age periods.

Distribution of the number of red blood cells in millions is shown in chart 2 and the mean values in table 3. From a mean of 4.88 ± 0.04 million in the blood of the cord the red blood cells also fall to a low mean of 3.9 ± 0.06 million between the ages of 2 and 4 months. There is a fairly steady increase from this age period up to the age of 12 years. The mean of 4.66 ± 0.02 million for this group is almost identical with the mean of 4.63 ± 0.02 million for the normal women of our series.

TABLE 4.—*Comparison of Mean Hemoglobin Values for the Group at the Clinic and Hospital and the Group at the State Home*

Age	Number at Clinic and Hospital	Hemoglobin, Gm. per 100 Cc.	Number at State Home	Hemoglobin, Gm. per 100 Cc.
2 to 3 years	7	12.84	7	12.74
3 to 4 years	20	13.25	6	12.95
4 to 5 years	13	13.39	10	13.49
5 to 6 years	18	13.34	16	13.20
6 to 7 years	21	13.37	12	13.29
7 to 8 years	18	13.39	11	13.24
8 to 9 years	20	13.76	21	13.53
9 to 10 years	28	13.93	11	13.66
10 to 11 years	32	13.96	15	14.06
11 to 12 years	23	14.31	13	14.06
12 to 13 years	25	14.57	15	14.36
Total	225		137	

Chart 3 and table 3 give the values for the volume of packed cells. The mean volume of cord blood is 53.18 ± 0.5 cc. per hundred cubic centimeters of blood. Here again the low mean of 34.18 ± 0.41 cc. appears in the period between 2 and 4 months. The mean is slightly higher between 4 and 8 months than in the two succeeding groups. After 18 months the mean value shows a progressive rise to the mean of 43.15 ± 0.19 cc. at 12 years. This again is almost identical with the mean of 43.22 ± 0.19 cc. which we have obtained for normal women.

The quantity of hemoglobin and the number of red blood cells in the blood of the cord probably do not represent the true values for the infant at birth.[29] Determinations on peripheral blood of the new-

29. Unpublished data on a small number of new-born infants seem to indicate that values for the number of red blood cells, the amount of hemoglobin and the volume of packed cells are lower in the blood of the cord than in venous blood. Values for the individual corpuscle are practically identical in samples from the two sources.

born infants of other series have given generally higher figures than those on the blood of the cord in our group.

Undue emphasis should not be placed on the mean or average value in any group; the distribution of individual values is equally significant. In our series the greatest range of values is found in the period from birth to the age of 2 months. The fact that the higher figures were generally obtained on the younger infants of the group is in keeping with the usual observation on individual babies that they show a rapid fall in blood values during the first weeks of life. After this initial period of adjustment to extrauterine existence, the range of values for

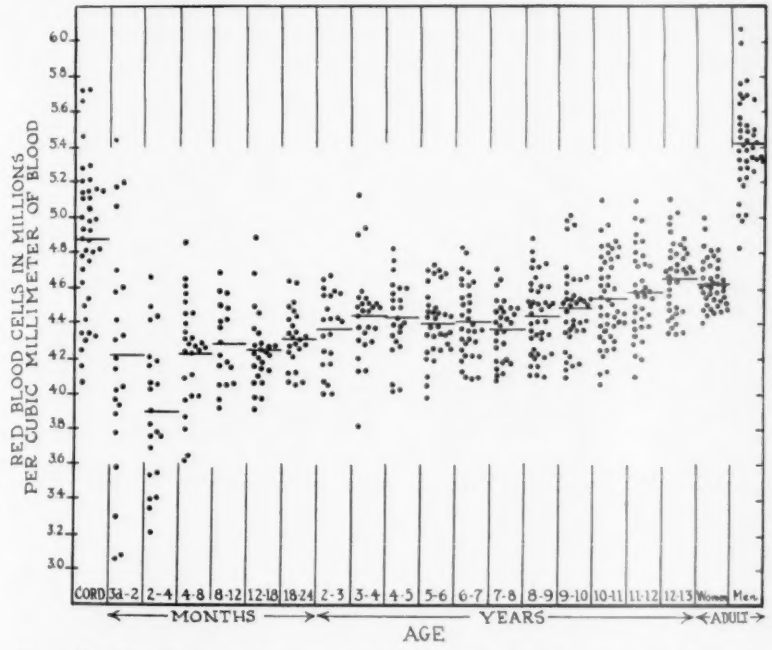

Chart 2.—Distribution of results of 628 determinations of the number of red cells in venous blood. The horizontal lines represent the mean values.

the children is generally comparable to that found in the blood of the normal adults of the series.

It is of interest to note that the general trend of the hemoglobin curve is the same in most of the reports on the blood of infants. The low mean, about 11 Gm., is reached in the series of Elvehjem and his co-workers,[7] Drucker[5] and Kato and Emery[8] and in ours between the second and the fourth month. In all these groups there is a slight rise between the ages of 4 and 8 months, followed by a second decrease. The sustained rise noted in our series beginning at about eighteen months is much more rapid than that observed by Elvehjem and co-workers.[7]

Mackay's [6] figures follow the same curve but at a lower level, while those of Merritt and Davidson [9] for the first year are higher than ours and do not show the decrease in the second six months. Williamson's [8] hemoglobin values, which are consistently higher than ours, can probably be accounted for by the difference in technic. Osgood's [21] findings on children over 4 years of age cannot be explained on the same basis. The results of our determinations on the blood of children by the Osgood-Haskins [26] acid hematin method were generally in close agreement with the values obtained on the same samples by the Van Slyke-

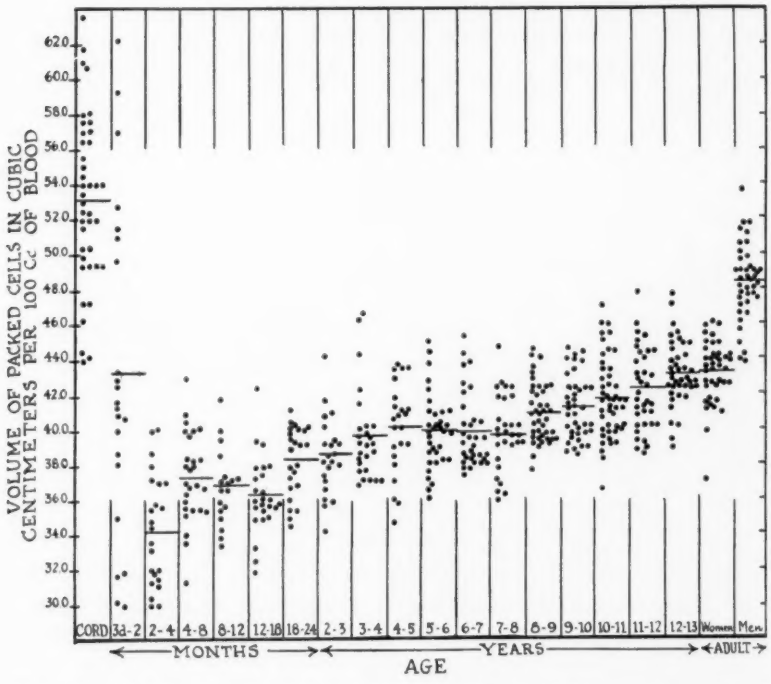

Chart 3.—Distribution of results of 628 determinations of the volume of packed cells in venous blood. The horizontal lines represent the mean values.

Neill [25] method of gas analysis. It would appear that the Oregon children represented in Osgood's series have a definitely lower average for hemoglobin and for cell volume but higher average for the number of red blood cells than children of the present series.

The highest value, 35.1 ± 0.26 micromicrograms, for mean corpuscular hemoglobin as shown in chart 4 and table 5 is found in the blood of the cord. The low mean, 27.5 ± 0.33 micromicrograms, is reached in the period between 8 and 12 months. This seems to indicate that after the initial parallel decreases in hemoglobin content and in the

number of red blood cells, the increase in the red blood cell count which follows is more rapid than the rise in hemoglobin content, resulting in a temporary lowering of the hemoglobin content of the cells. The adult level is regained by the seventh year. Mean values for older children fall between the mean of 30.5 ± 0.15 micromicrograms for the men and 31.2 ± 0.16 for the women of the series which we have previously reported.

The large size of the corpuscles at birth and in the first days of life, as has been reported previously [30] for both peripheral and venous blood,

TABLE 5.—*Statistical Data for Mean Corpuscular Hemoglobin, Mean Corpuscular Volume and Mean Corpuscular Hemoglobin Concentration*

Number of Determinations	Age	Corpuscular Hemoglobin* Mean	Standard Deviation	Probable Error of Mean	Coefficient of Variation, %	Corpuscular Volume† Mean	Standard Deviation	Probable Error of Mean	Coefficient of Variation, %	Corpuscular Hemoglobin Concentration‡ Mean	Standard Deviation	Probable Error of Mean	Coefficient of Variation, %
40	At birth (blood taken from the cord)	35.1	2.40	0.26	6.8	108.9	5.12	0.55	4.7	32.2	1.45	0.15	4.5
22	3 days-2 months	34.0	3.06	0.44	8.9	102.5	9.51	1.37	9.2	33.8	0.94	0.14	2.7
22	2-4 months	28.5	2.05	0.29	7.2	87.3	4.99	0.72	5.7	32.5	1.23	0.17	3.7
27	4-8 months	29.0	1.74	0.23	5.9	88.3	5.73	0.74	6.4	32.8	0.99	0.13	3.0
18	8-12 months	27.5	2.08	0.33	7.5	86.0	3.60	0.57	4.1	32.0	1.05	0.17	3.2
25	12-18 months	27.6	1.58	0.21	5.6	85.3	2.90	0.38	3.4	32.3	1.39	0.19	4.3
24	18-24 months	29.3	1.67	0.23	5.6	88.8	3.70	0.51	4.1	33.0	1.43	0.20	4.3
22	2-3 years	28.2	1.43	0.21	4.8	88.3	4.22	0.61	4.7	33.0	1.11	0.16	3.3
26	3-4 years	29.6	1.36	0.18	4.5	89.2	4.80	0.63	5.3	33.2	1.02	0.13	3.0
23	4-5 years	30.3	1.61	0.23	5.3	90.5	3.34	0.47	3.6	33.4	0.99	0.14	2.9
34	5-6 years	30.1	1.39	0.16	4.6	90.7	4.17	0.49	4.6	33.2	1.38	0.16	4.1
33	6-7 years	30.2	1.40	0.16	4.6	90.4	4.14	0.49	4.5	33.4	0.90	0.11	2.7
29	7-8 years	30.5	1.65	0.21	5.4	91.0	4.52	0.58	4.9	33.4	1.30	0.17	3.8
41	8-9 years	30.7	1.46	0.15	4.7	91.8	4.02	0.42	4.3	33.3	1.05	0.11	3.1
39	9-10 years	30.8	1.48	0.16	4.8	91.8	4.16	0.45	4.5	33.6	1.01	0.11	3.0
47	10-11 years	30.8	1.45	0.14	4.7	91.8	3.76	0.37	4.0	33.5	0.86	0.08	2.5
36	11-12 years	31.0	1.32	0.15	4.2	92.3	3.16	0.36	3.4	33.6	0.94	0.11	2.7
40	12-13 years	31.0	1.61	0.17	5.1	92.5	4.18	0.45	4.5	33.5	1.01	0.11	3.0
40	Women	31.2	1.53	0.16	4.8	93.3	3.75	0.40	4.0	33.4	1.08	0.11	3.2
40	Men	30.5	1.39	0.15	4.5	89.2	3.82	0.41	4.2	34.2	1.17	0.12	3.4

* The class unit used in group computation of statistical data is 1 micromicrogram.[28]
† The class unit used is 3 cubic microns.
‡ The class unit used is 1 per cent.

was again found in the present study. In the corpuscular volumes of chart 5 and table 5 the highest mean of 108.9 ± 0.55 cubic microns appears in blood of the cord. The large size of the corpuscles persists through the first few days of life, but in samples obtained from babies toward the end of the second month the cells are considerably smaller. There is consequently a wide range of values in this age period. The decrease in corpuscular volume is continued to the low mean of 85.3 ± 0.38 cubic microns between the ages of 12 and 18 months.

30. Mitchell.[15] Lucas and Dearing.[16] Van Creveld.[17] Guest.[18] Haden and Neff.[19]

Guest [18] found a somewhat similar decrease by following individual babies over a period of several months. An increase in volume begins after the eighteenth month, and the mean which we have found for normal men is approximated in the third year.

The values for older children lie between the mean of 89.2 ± 0.41 cubic microns for the men and 93.3 ± 0.40 for the women of our previously reported series. In order to learn whether the sexual difference in size of the red cell which we have observed in adults is also found in

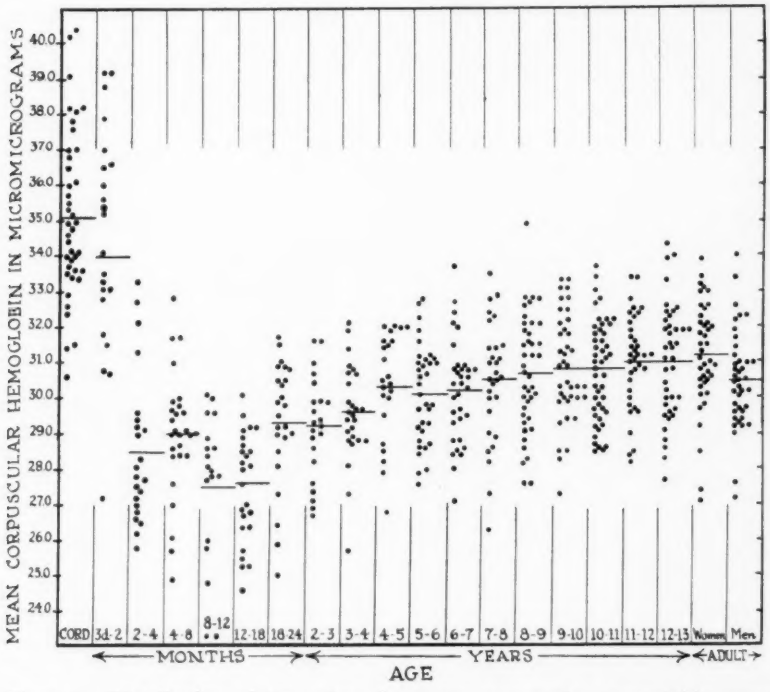

Chart 4.—Distribution of the values for mean corpuscular hemoglobin content in the red cells of 628 samples of venous blood. The horizontal lines represent the mean values.

the blood of children, table 6 was constructed. In thirteen of the 18 groups the mean corpuscular volume in the blood of the boys is lower than in that of the girls. Since the difference is small in most of the groups and is actually in favor of the boys in 5, the observed sexual difference is probably not significant.

The mean corpuscular hemoglobin concentration is given in chart 6 and table 5. From the coefficients of variation and from chart 6 it is evident that, in contrast to other values, the concentration of hemoglobin is a remarkably constant quantity. The mean in all groups of

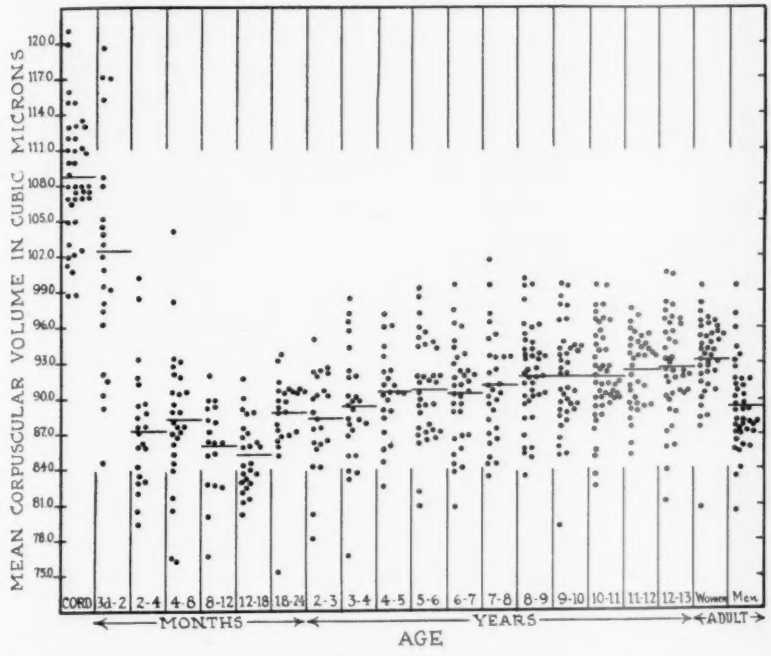

Chart 5.—Distribution of the values for mean corpuscular volume of the red cells in 628 samples of venous blood. The horizontal lines represent the mean values.

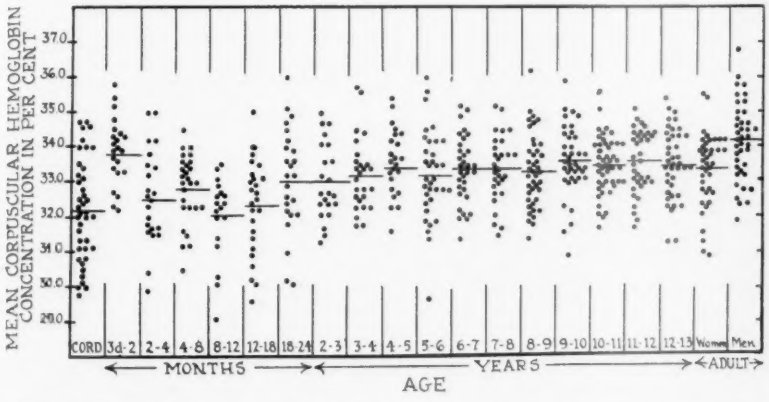

Chart 6.—Distribution of the values for mean corpuscular hemoglobin concentration in the red cells of 628 samples of venous blood. The horizontal lines represent the mean values.

children falls between 32 and 33.8 per cent. The greatest variation in individual values is found in cord blood but even here the mean is 32.2 ± 0.15 per cent. In the period between birth and the age of 2 months, when the values for the hemoglobin and the packed cell volume exhibit a wide range of fluctuation from the mean, the corpuscular hemoglobin concentration shows no more variation than in other age groups. The lowest mean, 32 ± 0.17 per cent, is found in the period between the age of 8 and that of 12 months. While this value is somewhat below the mean of 34.2 ± 0.12 per cent for the men of our series of normal adults and that of 33.4 ± 0.11 per cent for the women, the majority of the individual figures are still within the range of values for adults. In the same age group the values for the hemoglobin and the packed cell volume are definitely lower than those for the normal adults.

TABLE 6.—*Mean Corpuscular Volume According to Age and Sex*

Age	Number of Boys	Average in Cubic Microns	Number of Girls	Average in Cubic Microns
At birth (blood taken from the cord)..	20	106.2	20	110.5
3 days to 2 months.....	14	107.9	8	104.8
2 to 4 months.....	12	85.3	10	90.0
4 to 8 months.....	13	87.6	14	88.8
8 to 12 months.....	4	88.3	14	85.3
12 to 18 months.....	14	85.2	11	85.3
18 to 24 months.....	13	90.9	11	87.7
2 to 3 years.....	11	87.9	11	88.6
3 to 4 years.....	15	87.5	11	91.2
4 to 5 years.....	15	90.6	8	90.2
5 to 6 years.....	23	90.9	11	91.5
6 to 7 years.....	14	89.2	19	91.3
7 to 8 years.....	18	90.7	11	91.5
8 to 9 years.....	21	91.0	20	93.3
9 to 10 years.....	15	89.2	24	93.4
10 to 11 years.....	26	92.0	21	91.6
11 to 12 years.....	17	91.9	19	92.6
12 to 13 years.....	25	92.2	15	93.0
Total.....	290		258	

It is apparent that after the second year of life values for the individual corpuscles of the different groups of children are almost identical with those in the blood of normal adults. This suggests that the averages for hemoglobin, number of red blood cells and volume of packed cells, though lower than the values for adults, are probably normal for the children.

SUMMARY

The quantity of hemoglobin, the number of red blood cells and the volume of packed cells have been determined accurately on samples of venous blood from children ranging in age from birth to 13 years.

The children are divided into eighteen groups according to age, and the mean values are reported for each group. Differences in blood values between boys and girls are not considered to be especially sig-

nificant. Averages for the amount of hemoglobin, the number of red blood cells and the volume of packed cells which are high at birth reach a low level in the period between the ages of 2 and 4 months. There is a transient rise between the ages of 4 and 8 months, followed by a second decrease. The sustained increase begins at the age of 18 months and continues to the twelfth year. Values for the 12 year old children are practically identical with those for the normal women of our previously reported series.

The mean corpuscular hemoglobin content, volume and hemoglobin concentration are compared with mean values for normal adults of our series.

The means for corpuscular hemoglobin and volume are highest at birth and in the first few days of life. The lowest mean for corpuscular volume appears in the period between the ages of 12 and 18 months, and the adult level is reached in the 3 year old group.

The corpuscular hemoglobin concentration remains at a remarkably uniform level throughout the period of life covered in the present study. The majority of values for children of all ages fall within the range observed for the blood of normal adults.

Dr. J. P. Hanner obtained many of the specimens of blood.

RAPID TYPING OF PNEUMOCOCCI BY THE NEUFELD REACTION DIRECTLY FROM LARYNGEAL SWABS FROM INFANTS AND CHILDREN

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In the utilization of antipneumococcus serum in the treatment of pneumonia in infants and in children it is essential that early and rapid typing of the pneumococcus be made. The commonly used methods have been somewhat unsatisfactory. After the modification of the Neufeld reaction was described for rapid determination of the type of pneumococcus in the sputum of adults by Armstrong [1] and Logan and Smeall [2] in 1932 and somewhat further modified by Sabin in 1933,[3] we sought to modify the procedure in order to adapt it for typing of pneumococci in laryngeal swabs obtained from children.

In the older methods of typing pneumococci from children, considerable time was required. This was mainly due to a lack of suitable material, since children swallow their sputum. Pharyngeal or laryngeal swabs were therefore used. Such specimens contained relatively few pneumococci, and often the many contaminating organisms present overgrew them.

Previously the quickest known method of typing pneumococci from children was the technic described by Sabin in 1930 [4] for sputum from adults. He used the microscopic slide agglutination method on material obtained from peritoneal puncture of a mouse several hours after it was inoculated with sputum. Typing was rarely obtained for a child in less than four hours after the inoculation. In many instances there was an insufficient number of organisms for this test before from eight

From the Bureau of Laboratories, Department of Health; the Department of Pediatrics, New York University College of Medicine, and the Children's Medical Service, Bellevue Hospital.

1. Armstrong, R. R.: Brit. M. J. **1**:187, 1932.

2. Logan, W. R., and Smeall, J. T.: Brit. M. J. **1**:188, 1932.

3. Sabin, Albert B.: Immediate Pneumococcus Typing Directly from the Sputum by the Neufeld Reaction, J. A. M. A. **100**:1584 (May 20) 1933.

4. Sabin, Albert B.: Microscopic Agglutination Test in Pneumonia, J. Infect. Dis. **46**:469, 1930.

to ten hours. The method using the *Quellung* phenomenon or Neufeld reaction (swelling of the capsule) has been reported to shorten the time required for typing pneumococci from adults by Logan and Smeall and by Sabin.

This study was undertaken in order to compare the results of typing pneumococci from laryngeal swabs obtained from children and infants by the Neufeld technic with results obtained by other routine methods.

TECHNIC

The material for the study was obtained from patients in the Children's Medical Service, Bellevue Hospital. In each case the patient was observed clinically and roentgenologically.

To induce coughing so that small particles of sputum could be caught on a swab, the pharynx was irritated with the swab or a tongue depressor. One or two swabs were collected and inserted in a ¾ by 4 inch (2 by 10 cm.) test tube containing from 1.5 to 2 cc. of nutrient broth containing 0.2 per cent di-sodium hydrogen phosphate. The specimen was immediately taken to the laboratory. The particles of sputum were thoroughly removed from the swab by whirling the stick rapidly back and forth in the broth a number of times.

The specimen so obtained was studied by several methods, namely: (1) direct typing by the Neufeld reaction; (2) inoculation of a mouse, using microscopic and macroscopic agglutination technics, and (3) examination of blood agar plates streaked with the original material.

For the Neufeld procedure, the tube of broth containing the original material was centrifugated at high speed for from five to ten minutes to sediment the particles of sputum, pus cells and organisms. All but 1 or 2 drops of the supernatant fluid was decanted and retained for further use. A loopful of the sediment was mixed on a cover slip with two or three loopfuls of type-specific rabbit serum and a loopful of Löffler's alkaline methylene blue. The preparation was then examined as a hanging drop under oil for the *Quellung* phenomenon.

For study by the method of inoculation of a mouse, the supernatant fluid from the centrifugated specimen was used to resuspend the sediment, and the suspension was inoculated intraperitoneally into a mouse. Peritoneal puncture was done after several hours to determine the type of pneumococcus by means of the microscopic slide agglutination method.

An autopsy was performed on the mouse the following morning. Cultures were made of the peritoneal exudate and heart blood on blood agar plates. The heart blood was also inoculated directly into blood broth to save time in culturing. Subsequently, colonies of pneumococci from the blood agar plates were fished into blood broth. The pneumococci in the cultures were typed by macroscopic tube agglutination tests with type-specific horse serum. The peritoneum was washed with physiologic solution of sodium chloride, and the pneumococci were typed by microscopic slide agglutination tests with type-specific horse serum. In many instances the Neufeld test was also employed on the peritoneal exudate.

To facilitate typing, preliminary tests were made with grouped serums by both the Neufeld and the microscopic slide agglutination method.

Last, a dilution streaking was made of the original specimen on a blood agar plate to indicate the kind and also the approximate number of organisms present.

On routine examination the following organisms were noted and reported: Pneumococcus, Streptococcus haemolyticus, Streptococcus viridans, Staphylococcus aureus and Staphylococcus albus. On the following day two fishings were made of the most typical pneumococcus-like colonies into blood broth. When pneumococci were fished the type was determined by macroscopic tube agglutination with type-specific horse serum.

The technician attempting to learn the Neufeld technic needs only patience and a little experience. Having learned to recognize the swelling of the pneumococcus capsule, the subsequent attempts become increasingly easy.

A sample reading of a specimen as reported to the clinician is shown in table 1.

TABLE 1.—*Sample Reading of Specimen* *

Name:			Ward:	Age:		Date of Admission:		Type: I
Date	Specimen	Neufeld	Sabin	Sam	MHB	H.B.) Per.)	Pl. Ch.	Plate
	Throat swab	I	5 hours I	I	I	I	1. Vir. 2. I	Pn.+ Vir.++ H.S.± Aur.+

* In this table and in tables 4, 5 and 6 the following abbreviations are used: Sabin means the results of microscopic slide agglutination after peritoneal puncture of a mouse several hours after inoculation with the washings from the swab in broth. Sam means results of microscopic slide agglutination after autopsy on the mouse (twenty-four hours). MHB means results of inoculation of the heart blood of the mouse directly into broth (forty-eight hours). H.B. and Per. mean results of streakings of the heart blood and the peritoneal exudate, respectively, of the mouse on blood agar plates (seventy-two hours). Pl. Ch. means results from colonies fished from plate (forty-eight hours). Plate means results of dilution streaking of the original material on a blood agar plate (twenty-four hours). Pn. means Pneumococcus; Vir., Str. viridans; H.S. (also H.Str.), Str. haemolyticus; H. Staph., hemolytic staphylococcus, and Aur., Staph. aureus.

RESULTS AND COMMENT

The Neufeld reaction as adapted to the typing of pneumococci from laryngeal swabs of children gave positive results for 100 of 106 patients, or 94 per cent. As seen in table 2, the results were called positive in the sense that either a type of pneumococcus was identified directly by the Neufeld reaction, as shown in 83 cases, or pneumococci were not obtained by any method, as occurred in 17 cases. The majority of results showed a high degree of correlation between the Neufeld test and the other methods of typing (table 3). By most of the methods a specific type of pneumococcus was determined. In addition, there were 7 patients from whom type-specific pneumococci were obtained only by direct typing by means of the *Quellung* (swelling of the capsule) phenomenon, the methods of inoculation of a mouse and the plate method revealing no pneumococci. In only 6 cases, or 6 per cent, in which other methods disclosed a specific type did the Neufeld reaction fail to indicate a type. This new method of typing, therefore, proved of value not only as the most rapid method but also as the most reliable.

Direct typing by the Neufeld method has the advantage of speed over other methods by shortening the interval of typing from approximately six to twelve hours in a large proportion of cases in children to less than one hour. In patients who are acutely ill with pneumonia

TABLE 2.—*Comparison of Results Obtained by the Neufeld Method with Those of Other Methods of Typing Pneumococci*

	Number of Patients	Percentage
Neufeld reaction demonstrated a type-specific pneumococcus or results showed no discrepancies when compared with those obtained by other methods of typing		
Pneumococci typed by the Neufeld reaction	83	78.3
No pneumococci or only pneumococcus-like organisms observed by the Neufeld technic; no pneumococci disclosed by any other method	17	15.9
Total	100	94.3
Neufeld technic failed to indicate a type		
Pneumococci present but Neufeld technic failed to reveal the specific type found in exudate from a mouse or on a blood agar plate	5	4.7
No pneumococci seen by the Neufeld technic; exudate from mouse and material on plates showed a specific type	1	0.9
	6	5.6
Total number of patients studied	106	100.0

TABLE 3.—*Study of the Eighty-Three Cases in Which Pneumococci Were Specifically Typed by the Neufeld Method Compared with Results of Inoculation of a Mouse and Cultures on a Blood Agar Plate*

	Total Number of Patients	Type of Pneumococcus	Number of Patients
Total number of cases, pneumococci typed from laryngeal swab	83		
Typed by Neufeld technic alone (2 checked on other body fluids)	3	I	2
A single type corresponded by the Neufeld technic, inoculation of mouse and culture on blood agar plate	27	I	3
		V	2
		VII	2
		IX	1
		XIV	15
		XVIII	1
		XIX	3
A single type corresponded by the Neufeld test and inoculation of a mouse; no pneumococci isolated on culture on a blood agar plate	33	I	15
		III	1
		IV	1
		V	1
		VII	1
		IX	1
		XIV	5
		XVI	1
		XVIII	2
		XIX	5
A single type corresponded by the Neufeld test and on culture on a blood agar plate; no pneumococci in exudate of mouse	1	XV	1
Specific type or types determined by the Neufeld method; no pneumococci found on inoculation of a mouse or culture on blood agar	7	I	2
		I and IV	1
		VI	2
		XVI	1
		XIX	1
Multiplicity of types	12		

due to one of the dominant types, such as type I, V, VII, XIV or XIX, a specific type can be identified within one-half hour after collection of the material. In no instance was typing obtained by other methods in less time than by the modified Neufeld technic. In our series, the shortest interval between the inoculation of a mouse and the determination of a type by microscopic slide agglutination was two and one-half hours, this being a relatively rare occurrence.

It is difficult at times to determine the relative pathogenicity of the pneumococcus when more than one type is isolated from the laryn-

TABLE 4.—*Results with Other Pathologic Specimens Used as Checks on Laryngeal Swabs*

Number of Patients	Pathologic Specimen	Type of Organism	Organisms Cultured from Laryngeal Swabs: Neufeld Test	Inoculation of Mouse	On Plate
Corresponding results (14 cases)					
3	Material from middle ear...	Pn. I Pn. XIV Pn. XIX	Pn. 1 Pn. XIV Pn. XIX	Pn. I Pn. XIV Pn. XIX	 Pn. XIV Pn. XIX
9	Empyema fluid.....	Pn. I* Pn. I Pn. I Pn. V Pn. XIV† Pn. XIV Pn. XIV Pn. XIX H. Str.	Pn. I Pn. I Pn. I Pn. V Pn. XIV Pn. XIV Pn. XIV Pn. XIX No Pn., Str.	Pn. 1 Pn. I Pn. V, XVI Pn. XIV Pn. III Pn. XIV Pn. XIX No Pn., no Str.	 Pn. V Pn. XIV Pn. XIV Pn. XIV
1	Tissue of the lungs.....	Pn. VI	Pn. VI		
1	Postmortem puncture of lung	Staph. albus	No Pn.	No Pn.	Aur.
Discrepancies in results (2 cases)					
1	Postmortem puncture of lung	H. Str. H. Staph. B. proteus-vulgaris	Pn. XVI	Pn. XVI H. Str.	Vir. +++ H. Str. ++ Aur. ++
1	Spinal fluid, postmortem blood, postmortem puncture of lung	Pn. unclassified—32	Pn. XIX	Pn. XIX	
16	Totai				

* Also had type I in a postmortem lung puncture.
† Also had type XIV in a blood culture.

geal swab of a patient by any one of the methods. When pneumococci are cultured from pathologic specimens, such as blood, empyema fluid, spinal fluid or, at times, pus from the middle ear, an infecting type can be ascertained. However, when such materials are not available, clinical experience must be used to determine which of the multiple types is probably pathogenic and which is parasitic. A study of the patient's blood agglutinins for one or the other type is sometimes helpful.

We have been able to show that in a small series of cases, 14 of 16 (table 4), there was a high degree of correlation between the types of pneumococci or other organism obtained from laryngeal swabs by

the Neufeld technic and those found in other pathologic specimens. In 2 of the cases more than one type was isolated. In material from 1 patient the type V pneumococcus was observed by all three methods, and empyema due to the type V pneumococcus developed; the second pneumococcus, a type XVI, was present only in the mouse. On the swab from the second patient a type XIV pneumococcus was noted, as determined by the Neufeld reaction and later in the fishings from the dilution plate. Subsequently empyema developed, with the type XIV pneumococcus in the pleural fluid. In this case the type III pneumococcus (not type XIV) was cultured from the exudate of the mouse.

In 2 instances there seemed to be a discrepancy between the observations on samples from laryngeal swabs and those on other pathologic specimens. Type XIX was identified by the Neufeld method and by inoculation of a mouse in 1 patient, the results of direct typing thus agreeing with those of the routine methods of typing. Cultures of the spinal fluid and postmortem cultures of the blood and fluid from the lung, however, revealed a pneumococcus which did not react with any of the specific serums up to type XXXII (Cooper), as determined by macroscopic agglutination tests (the Neufeld test was not tried). In another instance, the type XVI pneumococcus was obtained by the Neufeld method and inoculation of a mouse. A postmortem puncture of the lung revealed hemolytic streptococci, hemolytic staphylococci and Bacillus proteus-vulgaris. It is probable that the presence of these organisms, particularly of B. proteus-vulgaris, in large numbers, caused the disappearance of the more labile pneumococcus or that the type XVI pneumococcus was merely a normal inhabitant of the throat. We are at a loss to say whether or not the type XVI pneumococcus was the infecting organism.

When more than one type is reported from a swab of the throat and no pathologic specimens are available to determine the infecting type, the clinician must attempt to determine which type is pathogenic. If one of the multiple types is common in normal patients, it may be disregarded in specific serum therapy; or certain clinical features of the case in the clinician's experience may indicate one of the types, such as the greater frequency of pleurisy, empyema or bacteremia in association with certain types. A series of cases in which multiple types were noted are listed in table 5. In 7 the Neufeld reaction occurred with only one type. The types which failed to show the *Quellung* phenomenon were pneumococci found frequently in healthy carriers (types III, VI and XIX), as demonstrated by Cooper,[5] Christie,[6] and Bliss, McClaskey

5. Cooper, G.; Rosenstein, C.; Walter, A., and Peizer, L.: J. Exper. Med. **55:** 531 (April) 1932.

6. Christie, Ian M.: Lancet **2:**39, 1934.

and Long.[7] Whether these organisms were present in minute numbers and were therefore overlooked or whether they failed to show the *Quellung* phenomenon was impossible to determine. During the past four years we have observed 425 patients in the children's medical wards at Bellevue Hospital who did not have pneumonia and observed pneumococci of types VI and XIX in high proportions.[8]

Furthermore, in 4 of 7 cases in which pneumococci failed to show the *Quellung* phenomenon on direct examination of the swab, the

TABLE 5.—*Analysis of the Multiple Types from Table 2*

Pneumococcus Types by			
Neufeld Method	Inoculation of Mouse	On Plate	Comment
I	I and VI	VI	No type VI by Neufeld method
I	I and VI	....	No type VI by Neufeld method
I	IX	....	No type IX by Neufeld method
I	I and XVIII	I	No type XVIII by Neufeld method; I was predominant
V	V and XVI	V	Type V in empyema fluid
IX	IX and XVII	....	No type XVII by Neufeld method
XIV	XIV and XIX	....	No type XIX by Neufeld method
XIV	III	XIV	Type XIV in empyema fluid
XIX	XIX	XXII	Type XXII not tried by Neufeld method
I and XVII	I and XVII	I and XVII	
V and VI	V and VI	....	
XIV and XXIX	XIV and XXIX	XIV and XXIX	TypeXIV was three times as numerous as type XXIX by the Neufeld method

TABLE 6.—*Cases in Which the Neufeld Reaction Failed to Show the Specific Type or Types Determined by Other Methods*

	Type of Pneumococcus				
Cases	Neufeld Reaction	Reaction in Mouse	Reaction on Plate	Other Organisms	Clinical Diagnosis
1*	No III and VII	III and VII	...	Vir.+++ Aur.++	Lobar pneumonia
2*	No VI	VI	VI	Pn.+ H.S.+ Aur.++	Infection of upper respiratory tract
3*	No VI	VI	...	Vir.++ Aur.+ H.Staph.	Lobar pneumonia
4*	No VI	VI	...	Vir.++++ Aur.+	Lobar pneumonia
5*	No VI	VI	...	H.S.+ Vir.+++ Aur.+++	Lobar pneumonia
6	Showed I, no IX	IX	...	H.S.± Vir.++ Aur.+	Lobar pneumonia

* There were pneumococci on direct examination, but no Quellung reaction was noted.

organism obtained by other methods was shown to be the type VI pneumococcus (table 6).

In 1 patient the type IX pneumococcus alone was obtained by inoculation of a mouse with material from the laryngeal swab. Specific serum therapy with type IX antibody was instituted in an early stage of the disease, but the child showed no response. From a second swab,

7. Bliss, E. A.; McClaskey, W. D., and Long, P. H.: J. Immunol. **27**:95 (July) 1934.

8. Nemir, R. L.; Andrews, E. T., and Vinograd, J.: Pneumonia in Infants and Children: A Bacteriologic Study with Special Reference to the Clinical Significance, Am. J. Dis. Child., to be published.

the type I pneumococcus was identified by the Neufeld reaction and type IX alone by inoculation of a mouse. Type I antipneumococcus serum was then administered to the child, with a prompt drop of temperature and a loss of toxic symptoms. It would seem, therefore, that the type I pneumococcus was the etiologic agent and could be determined only by direct examination of the specimen.

TABLE 7.—*Analysis of Diseases in Which the Neufeld Reaction Was Used to Determine the Type of Penumococcus*

Diagnosis	Number of Patients	Pneumococcus Typed by Neufeld Reaction: Number	Type	Number of Each Type	Type-Specific Pneumococcus Not Evident by Any Method	Neufeld Method Failed to Indicate a Type
Lobar pneumonia	65	55	I	20	5	5*
			IV	1		
			V	4		
			VI	2		
			VII	2		
			IX	2		
			XIV	14		
			XV	1		
			XVIII	1		
			XVI	1		
			XIX	3†		
			I & IV	1		
			V & VI	1		
			I & XVII	1		
			XIV & XXIX	1		
Bronchopneumonia	11	9	I	2	2	..
			XIV	2		
			XVI	1‡		
			XIX	4		
Broncholobular pneumonia	2	1	XIV	1	1	..
Lipoid pneumonia	1	1	VI	1	..	..
Empyema on admission	3	3	I	2	..	..
			XIV	1		
Abscess of the lung	1	1	XIV	1	..	..
Infections of upper respiratory tract	23	13	I	2	9	1§
			III	1		
			VII	1		
			IX	1		
			XIV	4		
			XVIII	1		
			XIX	3		

* The other methods showed type VII pneumococcus in one case, types III and VII in another and type VI in three cases.

† In one case there were pneumococci unclassified to type XXXII (Cooper) in other pathologic specimens.

‡ The empyema fluid in this case showed no pneumococci, only hemolytic streptococci and staphylococci.

§ In this case other methods disclosed type VI.

Table 7 gives an analysis of the results by the Neufeld reaction on all the patients with acute diseases of the respiratory tract included in this study. After thorough clinical and roentgenologic observations, 23 of the 106 patients proved to have infection of the upper respiratory tract without pneumonia. When pneumococci were present in the laryngeal swabs of the patients without pneumonia, they were typed by

the Neufeld method in 93 per cent of the cases. In 93 per cent of the cases of pneumococcic lobar pneumonia the pneumococci were also typed by the Neufeld reaction.

We believe that the Neufeld technic is the most rapid method of typing pneumococci and is as accurate, if not more so, than any of the other available technics.

CONCLUSIONS

A method of typing the pneumococci on laryngeal swabs from children according to the Neufeld reaction is described.

The type of pneumococcus can be determined for children and infants within an hour.

A correlation of observations by the modified Neufeld technic with those by other routine methods of typing was present in 94.3 per cent of our cases. In 78.3 per cent a specific type of pneumococcus was noted. No pneumococci were identified by any method in 16 per cent.

There is a high degree of correlation between the type obtained by the Neufeld reaction from the swab and that recovered from other pathologic specimens.

The *Quellung* phenomenon (swelling of the capsule) is obtained in pneumococci from patients with infections of the upper respiratory tract (93 per cent) as readily as in pneumococci from patients with pneumonia (93 per cent).

METABOLISM OF ADOLESCENT GIRLS

I. BASAL METABOLISM AND ENERGY EXCHANGE

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Although much work has been published on the basal metabolism of adolescent children and on the utilization of energy throughout the day as determined by calculations from the intake of food, few studies have been reported in which the balance of energy has been actually determined rather than calculated. We have been interested not only in the basal metabolism of adolescent girls but in the manner in which the total energy used by these girls throughout the day is distributed. We consider that if the energy represented by the basal metabolism and the energy of the excreta are subtracted from the energy of the food as determined by analysis there is obtained as close an estimation as is possible of the expenditure of energy for activity, growth and cost of digestion. Aside from Bedale's excellent report [1] on the energy expenditure and food requirements of children at school, we were unable to find any investigations of similar nature on adolescent girls. Unfortunately, Bedale's dietary study was based on calculated values for caloric intake, and no analyses were made of energy lost through excreta. Holt and Fales [2] estimated the balance of energy from values reported in the literature and supplemented these by the results of some dietary studies made by themselves. Of their subjects, only eight girls were within our age groups.

A great deal of valuable information has been obtained by the use of the respiration calorimeter, in which the energy expended in different activities has been determined. Aside from the fact that most of this work was done on adults, the fact still remains that the results do not represent the total energy utilized throughout the day under conditions of ordinary activity nor do they give us the information that we desire

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1. Bedale, E. M.: Energy Expenditure and Food Requirements of Children at School, Proc. Roy. Soc. London, s.B **94**:368, 1923.

2. Holt, L. E., and Fales, H. L.: The Food Requirement of Children: I. Total Caloric Requirement, Am. J. Dis. Child. **21**:1 (Jan.) 1921.

and think important by determining the total balance of energy by analysis of the food consumed and of the excreta.

The study of energy exchange present was made on a group of twenty-four girls and that of basal metabolism on thirty-four girls. These girls were attending public schools and came from homes of limited means.[3] In general, the hygienic conditions of their families may be described as fair. It is evident from the analysis of their weights by the Baldwin-Wood standards that most of them were underweight. We did not learn the reasons for this underweight, that is, whether they had been on abnormal diets or whether the underweight was the result of heredity or other constitutional factors. Physical examinations made in the hospital revealed no other abnormality.

BASAL METABOLISM

Method of Experiments.—For the determination of the basal metabolism, a modification of the Tissot gasometer in connection with the Henderson-Haldane apparatus for gas analysis was employed. Usually one or more preliminary training tests preceded the three duplicate determinations made on three consecutive days. The average of the two lowest metabolic rates, which varied not more than 4 per cent, is reported in this paper. In all cases, the tests were made early in the morning, and necessary precautions were taken to insure a postabsorptive state. A minimum rest period of thirty minutes preceded the test. The weight was recorded at the same time every morning on a platform scale, the so-called "silk scale," sensitive to 5 Gm. Tests were conducted on thirty-four girls between the ages of 11 and 20 years, of whom eighteen were prepubertal and sixteen had reached puberty. All tests were made during the intermenstrual period. Twenty-two of the girls between 12 and 15 years of age lived in the metabolism unit of the hospital for a minimum of two weeks. While in the hospital, they carried on their normal activities. During school hours they attended classes provided for convalescent patients by the hospital. Out of school hours they played outdoors or in the play-room, and on Sundays they were permitted to go to church or occasionally to amusement parks but all their activities were under constant supervision. The other twelve girls were brought to the metabolism ward on the mornings when the tests for basal metabolism were to be made.

Results.—In table 1, values are expressed in total calories per twenty-four hours; calories per kilogram per twenty-four hours; calories per centimeter per twenty-four hours, and calories per square meter per hour. For the eighteen prepubertal girls, aged from 11 to 14 years, the total values for basal production of heat per twenty-four hours vary from 968 to 1,429, with an average of 1,191. For the postpubertal girls, aged 13 to 20 years, the values for this total run from 1,153 to 1,511, with an average of 1,317. Although the values for this total in the postpubertal group average decidedly higher than

3. Dr. Elizabeth Clark, medical director of high school girls, and Miss Hazel Orr, director of physical education at Woodward High School, assigned these girls to us for study.

those in the prepubertal group, the average for calories per kilogram per twenty-four hours, 27.2, and that for calories per square meter per hour, 37, in the postpubertal group are less than the corresponding values in the prepubertal group, 33.6 and 40.2, respectively. This difference is undoubtedly due to the greater weight and greater surface

TABLE 1.—*Basal Metabolism of Adolescent Girls*

Subject	Age, Yr.-Mo.	Height, Cm.	Weight: Observed, Kg.	Weight: Deviation from Baldwin-Wood Standard, per Cent	Surface Area, Sq.M.	Pulse Rate	Respiratory Quotient	Calories per 24 Hours: Total	Calories per 24 Hours: Per Kg.	Calories per 24 Hours: Per Cm.	Calories per Sq.M. per Hour
				Prepubertal							
1*	10-7	144.9	30.95	—16.8	1.080	76	0.847	1,101	35.8	7.6	42.5
2*	10-7	144.6	31.23	—16.1	1.091	74	0.847	1,052	33.7	7.3	40.2
3	11-6	147.0	32.86	—14.0	1.181	68	0.805	1,204	36.7	8.2	42.5
4	11-10	150.5	41.32	— 0.5	1.324	76	0.852	1,242	30.1	8.3	39.1
5	12-1	151.0	36.25	—13.1	1.256	62	0.777	1,138	31.4	7.5	37.8
6	12-1	139.6	30.47	— 7.6	1.102	76	0.858	1,074	35.3	7.7	40.6
7	12-3	156.8	36.18	—22.9	1.290	78	0.812	1,273	35.2	8.2	41.1
8	12-3	136.6	28.97	— 7.3	1.062	78	0.899	1,044	36.1	7.7	41.0
9	12-3	153.8	41.96	— 5.6	1.354	84	0.836	1,262	30.1	8.3	38.9
10	12-5	144.1	40.52	+12.4	1.273	70	0.865	1,211	29.9	8.4	39.7
11	12-8	147.3	30.45	—22.5	1.145	80	0.816	1,144	37.6	7.8	41.6
12	12-8	146.3	35.51	— 7.7	1.217	78	0.820	1,242	35.0	8.5	42.6
13	12-9	148.4	32.62	—18.3	1.186	90	0.785	1,090	33.4	7.4	38.3
14	12-9	156.9	38.87	—18.4	1.330	87	0.864	1,285	33.1	8.2	40.3
15	13-2	160.5	37.24	—26.0	1.328	76	0.805	1,316	35.3	8.2	41.3
16	13-5	167.4	43.85	—21.8	1.467	82	0.836	1,362	31.1	8.2	38.7
17	13-7	138.3	27.63	—18.8	1.049	82	0.858	968	35.1	7.0	38.5
18	14.5	166.5	46.94	—15.7	1.504	62	0.859	1,429	30.5	8.6	39.6
Average	12-5	150.0	35.77	—13.4	1.236	77	0.836	1,191	33.6	8.0	40.2
				Postpubertal							
19	13-2	163.0	45.59	—13.4	1.463	86	0.830	1,300	28.5	8.0	37.0
20	13-8	154.4	36.65	—22.5	1.282	80	0.868	1,193	32.6	7.8	38.8
21	14-1	156.4	48.16	— 1.2	1.453	92	0.846	1,359	28.2	8.7	39.0
22	14-6	156.6	40.40	—20.1	1.350	76	0.868	1,271	31.5	8.1	39.3
23	14-6	154.1	43.74	—10.0	1.380	70	0.879	1,184	27.1	7.7	35.7
24	14-7	164.5	50.88	— 5.5	1.543	68	0.814	1,460	28.8	8.9	39.5
25	14-8	165.7	60.79	+ 9.3	1.673	88	0.794	1,511	24.9	9.1	37.6
26	15-3	161.7	52.98	— 1.1	1.551	62	0.789	1,382	26.1	8.6	37.1
27	15-10	160.8	51.77	— 3.2	1.529	80	0.803	1,153	22.3	7.2	31.5
28	16-0	163.7	49.21	—10.5	1.517	74	0.939	1,424	28.9	8.7	39.1
29	16-2	150.5	44.50	— 6.1	1.367	80	0.795	1,239	27.9	8.3	37.8
30	16-10	154.3	62.44	+23.1	1.628	80	0.870	1,428	22.9	9.3	36.6
31	17-0	166.3	57.33	— 0.5	1.636	82	0.794	1,285	22.5	7.7	32.8
32	17-6	160.6	44.06	—19.5	1.426	74	0.874	1,285	29.2	8.0	37.5
33	17-8	156.8	52.59	— 1.3	1.512	88	0.875	1,330	25.3	8.5	36.7
34	19-6	162.5	45.25	—19.6	1.455	84	0.759	1,260	27.9	7.8	36.1
Average	15-8	159.5	49.15	— 6.4	1.485	79	0.837	1,317	27.2	8.3	37.0

* Twins.

area of the postpubertal group, whose weights average 49.15 Kg. as against 35.77 Kg. for the prepubertal group, and the corresponding values for surface area are 1.485 and 1.236 square meters, respectively. Owing to the comparatively small difference in the height of the postpubertal group, their production of heat in calories per centimeter per twenty-four hours runs slightly higher than that of the prepubertal group; the values for the postpubertal group range from 7.2 to 9.3, with an average of 8.3, and those for the prepubertal group from 7 to 8.6, with an average of 8.

In table 2, the values for total basal production of heat per twenty-four hours are compared with the standards of Benedict-Talbot referred to age and to weight and those of Dreyer, Harris and Benedict and the Girl Scouts. The standards of Boothby and Sandiford, Benedict and Talbot and Aub and DuBois, referred to age, are compared with our values for calories per square meter per hour. The only standard available for comparison with our values for calories per kilogram of body weight per twenty-four hours is that of Benedict referred to age.

TABLE 2.—*Percentage Deviations from Standards*

	Calories per 24 Hours					Calories per Sq. M. per Hour			Calories per Kg. per 24 Hours;
Subject	Benedict-Talbot Referred to Age	Benedict-Talbot Referred to Weight	Dreyer Referred to Age and Weight	Harris-Benedict Referred to Age, Weight and Height	Girl Scouts	Boothby-Sandiford Referred to Age	Benedict-Talbot Referred to Age	Aub-DuBois Referred to Age†	Benedict Referred to Age
				Prepubertal					
1	+ 9.0	+ 3.1	— 2.9	— 5.7	.....	— 4.5	+ 5.5	.....	.....
2	+ 4.2	— 2.1	— 7.6	—10.1	.....	— 9.8	— 0.2	.....	.....
3	+14.1	+ 8.5	+ 4.3	+ 1.6	—12.4	— 1.3	+ 5.9	— 5.3	+18.3
4	+17.7	+ 1.0	— 4.1	— 2.4	— 9.7	— 9.1	— 2.5	—12.8	— 3.1
5	+ 7.9	— 4.1	— 6.2	— 7.1	—17.2	—12.2	— 5.9	—15.7	+ 1.3
6	+ 1.8	+ 1.7	— 3.5	— 6.6	—21.9	— 5.6	+ 1.3	— 9.4	+13.9
7	+20.7	+ 7.4	+ 5.0	+ 3.0	— 7.4	— 4.5	+ 2.5	— 8.3	+18.1
8	— 1.1	+ 2.4	— 3.5	— 7.4	—24.1	— 4.7	+ 2.2	— 8.6	+21.1
9	+19.7	+ 2.5	— 3.4	— 1.8	— 8.2	— 9.7	— 3.1	—13.1	+ 1.0
10	+14.8	— 1.3	— 5.6	— 3.4	—11.9	— 7.8	— 1.1	—11.5	+ 0.4
11	+ 4.0	+ 8.4	+ 4.0	— 1.2	—16.8	— 1.0	+ 4.1	— 7.2	+26.2
12	+12.9	+ 6.2	+ 4.6	+ 3.2	— 9.7	+ 1.3	+ 6.4	— 5.0	+17.4
13	— 1.0	— 1.4	— 3.4	— 7.4	—20.7	— 8.8	— 4.3	—14.5	+22.7
14	+16.8	+ 5.4	+ 3.4	+ 2.3	— 6.6	— 4.2	+ 0.6	—10.2	+15.7
15	+19.6	+ 9.1	+ 8.2	+ 5.6	— 4.3	— 1.7	+ 3.3	— 7.9	+23.4
16	+23.8	+10.0	+ 3.2	+ 2.9	— 1.0	— 7.9	— 3.4	—13.8	+13.5
17	—14.8	— 2.3	— 6.7	—12.8	—29.6	— 6.3	— 3.3	—10.6	+28.1
18	+25.8	+14.5	+ 5.7	+ 6.1	+ 3.9	— 3.6	— 0.7	— 7.9	+22.0
Average	+10.9	+ 3.8	— 0.5	— 2.3	—12.4*	— 5.6	+ 0.4	—10.1*	+13.3*
				Postpubertal					
19	.....	+ 4.6	— 4.3	— 2.4	— 5.5	—11.9	.....	—17.4	— 0.4
20	.....	— 0.1	— 0.5	— 2.7	—13.2	— 5.4	.....	— 9.7	+18.8
21	.....	+ 8.6	— 0.8	+ 1.4	— 1.2	— 4.9	.....	— 9.3	+ 7.6
22	.....	+ 3.7	+ 1.8	+ 0.8	— 7.6	— 0.6	.....	— 8.7	+25.8
23	.....	— 4.3	— 8.5	— 8.2	—13.9	— 9.6	.....	—17.0	+ 8.2
24	.....	+15.9	+ 4.7	+ 6.2	+ 6.2	— 0.2	.....	— 8.3	+15.0
25	.....	.....	— 0.9	+ 2.6	+ 9.9	— 4.8	.....	—12.5	— 0.4
26	.....	+ 9.0	— 3.0	— 0.8	+ 0.5	— 6.1	.....	—13.7	+15.5
27	.....	— 8.8	—17.4	—16.1	—16.1	—18.3	.....	—26.1	+ 1.6
28	.....	+13.4	+ 4.7	+ 5.2	+ 3.6	+ 1.6	.....	— 9.1	+31.9
29	.....	— 0.1	— 4.3	— 3.6	— 9.9	— 2.0	.....	—12.0	+27.2
30	.....	.....	— 6.0	— 1.7	+ 3.9	— 2.6	.....	— 8.5	+ 5.1
31	.....	+ 0.4	—11.8	—10.3	— 6.5	—12.7	.....	—18.0	+ 3.0
32	.....	+ 3.8	+ 1.4	— 0.4	— 6.5	+ 1.4	.....	— 1.3	+34.0
33	.....	+ 5.1	— 4.0	— 2.5	— 3.3	— 1.0	.....	— 3.4	+16.1
34	.....	+ 1.5	— 0.5	— 2.7	.....	— 1.1	.....	— 5.0	+28.0
Average	.....	+ 3.8‡	— 3.1	— 2.2	— 4.0§	— 4.9	.....	—11.3	+14.8

* Average of 16.
† Standard assumed as 44.8 calories per square meter per hour for the ages of 12 and 13.
‡ Average of 14.
§ Average of 15.

Prepubertal Girls: In comparisons with the nine standards, the average deviation of the prepubertal girls falls within 10 per cent of

five standards. The individual variations are all within 10 per cent of the Dreyer and Benedict-Talbot standards (calories per square meter per hour for age), with average deviations of —0.5 and + 0.4 per cent. The deviations in comparisons with the Harris-Benedict standard are very slightly greater, averaging —2.3 per cent, with those in two of eighteen cases over 10 per cent. The Benedict-Talbot standard referred to weight appears to be slightly too low for the majority of the girls in this group. Thirteen of eighteen have a higher metabolic rate than the standard, although only two have a deviation of 10 per cent or over. On the other hand, the Boothby-Sandiford standard seems to be too high for this group of girls. All the girls but one have a lower heat production than the standard, with an average deviation of —5.6 per cent. Of the remaining four standards, the Aub-DuBois and the Girl Scouts are decidedly too high for our girls. All our subjects have a lower heat production than the Aub-DuBois standard, and all but one lower than the Girl Scouts' standard, with an average of —10.1 and —12.4 per cent, respectively. In applying the Aub-DuBois standard for girls aged 12 and 13, we have used the same assumption Benedict did in his study of American-born Chinese girls.[4] The remaining two standards, the Benedict for calories per kilogram per twenty-four hours referred to age and the Benedict-Talbot referred to age, are decidedly too low for this group. All but one of our group have a higher metabolic rate than the Benedict, and only three have a lower heat production than the Benedict-Talbot. The average deviation from the Benedict standard is +13.3 per cent, and that from the Benedict-Talbot is +10.9 per cent.

Postpubertal Girls: The individual variation in this group is greater than that in the prepubertal group, although of seven comparisons the average deviation in five runs within 5 per cent. Subjects 27 and 31, whose heat production is exceptionally low, show a wide divergence from all of the standards except the Benedict-Talbot referred to weight and the Benedict for calories per kilogram per twenty-four hours. The Girl Scouts' standard compares far more favorably with the values of this group than with those of the prepubertal girls. The average deviation is only —4 per cent. The Harris-Benedict, as well as the Benedict-Talbot standard referred to weight, compares as well with the values for this group as with those for the younger girls, the average deviations from the two standards being —2.2 and + 3.8 per cent, respectively. Although the average deviation from Dreyer's standard is slightly higher, being —3.1 per cent, his standard compares nearly as favorably as the Harris-Benedict.

4. Benedict, F. G., and Meyer, M. H.: The Basal Metabolism of American-Born Chinese Girls, Chinese J. Physiol. **7**:45 (March) 1933.

The Boothby-Sandiford standard, although slightly better than in the prepubertal group, appears still a little high for this group, with an average deviation of —4.9 per cent. The Aub-DuBois standard is again too high, while that of Benedict per kilogram of body weight referred to age is too low, with an average deviation of —11.3 and +14.8 per cent, respectively.

General Comment.—Using the 15 per cent limit generally accepted [5] in the prepubertal group, we find that all of our subjects come within this limit in comparisons with five of the nine normal standards used, i. e., the Dreyer, the Harris-Benedict and the Benedict-Talbot referred to weight, for total calories per twenty-four hours, and the Boothby-Sandiford and the Benedict-Talbot referred to age, for calories per square meter per hour. Only one subject is beyond this limit according to the Aub-DuBois standard, and six, seven and ten, respectively, exceed the 15 per cent limit in comparisons with the Girl Scouts, the Benedict-Talbot for total calories per twenty-four hours referred

TABLE 3.—*Average Heat Production of Different Age Groups*

Age, Years	Subjects	Heat Production			
		Calories per 24 Hours			Calories per Sq. M. per Hour
		Total	Per Kg.	Per Cm.	
11	2	1,077	34.8	7.5	41.4
12	8	1,181	33.1	8.0	40.1
13	7	1,248	33.4	8.0	40.0
14	4	1,237	31.6	8.0	39.0
15	5	1,362	27.7	8.5	37.8
16	3	1,272	26.4	8.1	36.1
17	2	1,357	22.7	8.5	34.7
18	2	1,308	27.3	8.3	37.1
20	1	1,260	27.9	7.8	36.1

to age and the Benedict for calories per kilogram per twenty-four hours.

In the postpubertal group, if subject 27 is eliminated, the values lie within the 15 per cent limit in comparisons with four of seven standards, namely, the Dreyer, Harris-Benedict, Girl Scouts and Boothby-Sandiford. Only one subject exceeds the 15 per cent deviation according to the Benedict-Talbot standard for total calories per twenty-four hours referred to weight. Eight subjects have values exceeding 15 per cent in comparison with the Benedict standard for calories per kilogram per twenty-four hours referred to age.

Our findings agree with those of Jenkins,[6] who, in a statistical comparison of prediction standards, stated that he considered the Dreyer

5. DuBois, E. F.: Recent Advances in the Study of Basal Metabolism: II. Basal Metabolism and Surface Area, J. Nutrition **3**:331 (Nov.) 1930.

6. (*a*) Jenkins, R. L.: Basal Metabolism Standards: A Statistical Comparison of Their Prediction Values, J. Nutrition **4**:305 (Sept.) 1931; (*b*) Basal Metabolism: I. The Error of Basal Metabolism Determination and the Normal Range of Basal Metabolism, Arch. Int. Med. **49**:181 (Feb.) 1932.

and Harris-Benedict standards based on observed weights as sounder than the Aub-DuBois and that for general application to children as well as adults he preferred the Dreyer standard.

Because the discussion of our data on prepubertal and postpubertal groups crosses age grouping, we have rearranged the results on the basis of average age groups (table 3). The fact that our results both in the prepubertal and postpubertal groups and in the age groups of table 3 do not show the prepubertal rise noted by many investigators [7] is not to be considered as evidence against its occurrence, for our data are not pertinent to this question.

In the foregoing discussion the energy values are referred to the different standards. Perhaps a clearer way to show the relationship is

TABLE 4.—*Coefficients of Correlation* *

Basal Metabolism (34 Girls)					
Basal Metabolism per 24 Hours			**Basal Metabolism per Kg. per 24 Hours**		
To height	+0.830	±0.036	To height	−0.611	±0.073
To weight	+0.803	±0.039	To weight	−0.906	±0.021
To age	+0.467	±0.091	To age	−0.721	±0.056
To surface area	+0.836	±0.035	To surface area	−0.872	±0.029
Energy Exchange (22 Girls)					
Intake per 24 Hours			**Intake per Kg. per 24 Hours**		
To height	+0.505	±0.107	To height	−0.564	±0.098
To weight	+0.376	±0.123	To weight	−0.825	±0.046
To age	+0.393	±0.122	To age	−0.342	±0.127
To total basal heat production	+0.330	±0.128	To total basal heat production per Kg.	+0.696	±0.074
To total calories for growth and activity	+0.830	±0.045	To calories per Kg. for growth and activity	+0.898	±0.028
To total urinary loss	+0.296	±0.131	To urinary loss per Kg	+0.621	±0.088
To total fecal loss	+0.313	±0.130	To fecal loss per Kg	+0.527	±0.104
To total loss in excreta	+0.345	±0.127	To loss in excreta per Kg	+0.738	±0.065
Gain or loss in weight per 24 hours to calories per 24 hours for growth and activity				+0.369	±0.101

* Subjects 35 and 36 are not included in this table owing to incomplete data.

to correlate the values with the different attributes included in those standards (table 4). When the values for the total basal production

7. (*a*) Bedale.[1] (*b*) MacLeod, G.: Studies of the Normal Basal Energy Requirement, thesis, Columbia University, 1924. (*c*) Göttche, O.: Gasstoffwechseluntersuchungen im Kindesalter. Die Pubertätsreaktion, Monatschr. f. Kinderh. **32**:22, 1926. (*d*) Lax, H., and Petenyi, G.: Der Grundumsatz im Pubertätsalter, ibid. **36**:381 and 385, 1928. (*e*) Topper, A., and Mulier, H.: Basal Metabolism in Children of Abnormal Body Weight: In Underweight Children, Am. J. Dis. Child. **38**:299 (Aug.) 1929. (*f*) Basal Metabolism in Children of Abnormal Body Weight: Basal Metabolism of Overweight Children, J. A. M. A. **92**:1903 (June 8) 1929. (*g*) Topper, A.: Basal Metabolism in Diabetic Children, Am. J. Dis. Child. **42**:760 (Oct.) 1931. (*h*) Topper, A., and Mulier, H.: Basal Metabolism of Normal Children: The Puberty Reaction, ibid. **43**:327 (Feb.) 1932. (*i*) Bruen, J.: Variation of Basal Metabolic Rate per Unit Surface Area with Age: II. The Pubertal Acceleration, J. Nutrition **6**:386 (July) 1933.

of heat per twenty-four hours are used, height and surface area give the highest correlation coefficients, $+0.83 \pm 0.036$ and $+0.836 \pm 0.035$, respectively, with weight giving almost as good, $+0.803 \pm 0.039$; but that of age is far below those of the other factors, namely, $+0.467 \pm 0.091$. Of course, our age range is narrow, from

TABLE 5.—*Basal Heat Production of Adolescent Girls as Reported by Different Authors*

Age		Bedale*	MacLeod	Blunt and Associates	Present Study
11	Calories per 24 hours	988	1,191	1,188	1,077
	Calories per Kg. per 24 hours	30.4	29.2	33.7	34.8
	Calories per sq. m. per hour	40.9	37.5	41.4	41.4
	Calories per cm. per 24 hours	6.9	7.9	8.3	7.5
	Number of subjects	2	4	13	2
12	Calories per 24 hours	1,498	1,295	1,309	1,181
	Calories per Kg. per 24 hours	40.8	32.3	32.4	33.1
	Calories per sq. m. per hour	47.7	41.3	42.4	40.1
	Calories per cm. per 24 hours	10.2	8.6	8.7	8.0
	Number of subjects	3	18	18	8
13	Calories per 24 hours	1,402	1,365	1,437	1,248
	Calories per Kg. per 24 hours	30.6	31.1	30.2	33.4
	Calories per sq. m. per hour	43.9	41.0	41.0	40.0
	Calories per cm. per 24 hours	8.8	8.9	9.2	8.0
	Number of subjects	10	22	15	7
14	Calories per 24 hours	1,478	1,308	1,380	1,237
	Calories per Kg. per 24 horus	....	26.7	31.1	31.6
	Calories per sq. m. per hour	43.1	36.6	40.8	39.0
	Calories per cm. per 24 hours	....	8.2	8.7	8.0
	Number of subjects	3	3	3	4
15	Calories per 24 hours	1,228	.....	1,498	1,362
	Calories per Kg. per 24 hours	24.8	....	21.8	27.7
	Calories per sq. m. per hour	34.1	....	35.3	37.8
	Calories per cm. per 24 hours	7.6	....	9.0	8.5
	Number of subjects	1	....	2	5
16	Calories per 24 hours	1,456	.....	1,317	1,272
	Calories per Kg. per 24 hours	27.1	....	25.1	26.4
	Calories per sq. m. per hour	38.3	....	34.5	36.1
	Calories per cm. per 24 hours	8.9	....	7.9	8.1
	Number of subjects	4	....	2	3
17	Calories per 24 hours	1,363	.....	1,543	1,337
	Calories per Kg. per 24 hours	....	....	25.7	22.7
	Calories per sq. m. per hour	37.0	....	34.8	34.7
	Calories per cm. per 24 hours	....	....	7.7	8.5
	Number of subjects	5	....	3	2
18	Calories per 24 hours	1,349	.....	1,406	1,308
	Calories per Kg. per 24 hours	23.4	....	25.7	27.3
	Calories per sq. m. per hour	31.8	....	36.7	37.1
	Calories per cm. per 24 hours	8.1	....	8.5	8.3
	Number of subjects	2	....	3	2

* In her table of basal metabolism, Bedale listed ages in years only, disregarding months, whereas in our study age is stated to the nearest year; that is, 10 years and 6 months or over is counted as 11 years. Bedale would consider this as 10 years. Consequently, in this table we took her values comparable to our method of figuring.

12 to 15 years, which may detract from the significance of this correlation. When the values for basal metabolism per kilogram of body weight are used in the correlation, the findings are markedly different. The coefficients for weight and surface area, with values of -0.906 ± 0.021 and -0.872 ± 0.029, are higher than that for height. Age shows a much closer correlation on the basis of values per kilogram. -0.721 ± 0.056, than when values for the total basal production of heat are used.

Our average values for total calories per twenty-four hours for age groups when compared with those of other investigators [8] (table 5) are in general markedly lower, with the exception of two of Bedale's groups (the 11 and 15 year old group); but our values are higher when expressed according to body weight. They are fairly comparable in terms of surface area, with all deviations falling within 10 per cent, except in comparison with some of Bedale's groups, as shown in table 6. This variation is probably due to the fact that both MacLeod and Bedale carefully selected their subjects on the basis of normal nutrition, while Blunt, Tilt, McLaughlin and Gunn had fewer underweight children than we had. Blunt and her associates stated that children of normal weight can be compared on the basis of total calories and calories per kilogram of body weight, but that underweight or overweight children can be compared only on the basis of calories per

TABLE 6.—*Percentage Deviation of Values for Basal Heat Production Recorded by Previous Investigators from Our Values*

	Bedale				MacLeod				Blunt and Associates			
Age	Per 24 Hr.	Per Kg. per 24 Hr.	Per Sq.M. per Hr.	Per Cm. per 24 Hr.	Per 24 Hr.	Per Kg. per 24 Hr.	Per Sq.M. per Hr.	Per Cm. per 24 Hr.	Per 24 Hr.	Per Kg. per 24 Hr.	Per Sq.M. per Hr.	Per Cm. per 24 Hr.
11	— 8.3	—12.6	— 1.2	— 8.0	+10.6	—16.1	— 9.4	— 5.3	+10.3	— 3.2	± 0.0	+10.7
12	+26.9	+23.3	+19.0	+27.5	+ 9.7	— 2.4	+ 3.0	+ 7.5	+10.8	— 2.1	+ 5.7	+ 8.8
13	+12.4	— 8.4	+ 9.8	+10.0	+ 9.4	— 6.9	+ 2.5	+11.3	+15.1	— 9.6	+ 2.5	+15.0
14	+19.5	.....	+10.5	.....	+ 5.7	—15.5	— 6.2	+ 2.5	+11.6	— 1.6	+ 4.6	+ 8.8
15	— 9.8	—10.5	— 9.8	—10.6	.....	.....	.....	.....	+10.0	—21.2	— 6.6	+ 5.9
16	+14.5	+ 2.7	+ 6.1	+ 9.9	.....	.....	.....	.....	+ 3.5	— 4.9	— 4.4	— 2.5
17	+ 0.4	.....	+ 6.6	.....	.....	.....	.....	.....	+13.7	+13.2	+ 0.3	— 9.4
18	+ 3.1	—14.3	—14.3	— 2.4	.....	.....	.....	.....	+ 7.5	— 5.9	— 1.1	+ 2.4

square meters. It is also possible that our subjects had a higher degree of relaxation, as, with few exceptions, they had several preliminary practice tests before the values reported here were secured.

ENERGY BALANCE

Method of Experiments.—The twenty-four girls who lived in the metabolism unit for two weeks, as described under "Basal Metabolism," were permitted to have their choice of food, in both kind and quantity, for the first three days. The food was carefully weighed, and the diet for the following eleven days was prepared on this basis. Only distilled water was used during the experiment. Of the eleven days, five served as a preliminary period, and the following six were divided into two three day periods, during which daily specimens of urine, aliquots of the daily ration and three day specimens of the feces were collected and placed immediately in a refrigerator at 4 C. For marking the specimens of feces about 0.2 Gm. of carmine in gelatin capsules was taken half an hour

8. (*a*) Bedale.[1] (*b*) MacLeod.[7b] (*c*) Blunt, K.; Tilt, J.; McLaughlin, L., and Gunn, K. B.: The Basal Metabolism of Girls, J. Biol. Chem. **67**:491 (Feb.) 1926.

before the breakfast of the first day of each period and again half an hour before the breakfast on the day following each period. At the end of three days, aliquots of urine were combined and 15 cc. samples taken in triplicate for the determination of energy value, preserved with 50 mg. of salicylic acid and dried by electric fan according to the method of Higgins and Benedict.[9] The aliquots of foods, either one fifth or one tenth of the daily intake, were combined at the end of each period and dried over steam coils at a temperature of about 60 C. The specimens of feces preserved with known amounts of salicylic acid were treated in the same way. They were then ground, sifted, made into pellets and vacuum-dried according to the method of Atwater and Snell.[10] The energy value was determined in a Riche adiabetic calorimeter according to the procedure described by Benedict and Higgins.[11]

Results.—In table 7 the subjects are listed according to increasing body weight. The values of calories for the twenty-four hour total intake vary greatly with individual subjects, from 1,837 to 3,494, averaging 2,279. The values for calories per kilogram also show a wide variation, ranging from 36.1 to 99.6, with an average of 60.2. In table 4, these values are correlated with height, weight, age, urinary and fecal loss, basal metabolism and calories for growth and activity. Of the values for total per twenty-four hours the calories for activity and growth have the highest coefficient of correlation, $+ 0.830 \pm 0.045$. The next highest coefficient is that of height, which is $+ 0.505 \pm 0.107$, a value that substantiates the statement of Wait and Roberts that height is a better single standard of reference for caloric intake per twenty-four hours than either weight or age.[12] However, their coefficient of correlation is somewhat lower than ours, being only $+ 0.26 \pm 0.088$, although it is higher than that of their correlation of weight or of age with intake. With the exception of age, our coefficients of correlation between intake per kilogram and the various factors mentioned are all over ± 0.5. The highest correlation is that between caloric intake per kilogram and calories for growth and activity, $+ 0.898 \pm 0.028$.

When our average value for total caloric intake is compared with that of Bedale, using the same age groups of 12, 13, 14 and 15 years, ours is 23.7 per cent lower than hers. Our values are about 5 per cent below those of Wait and Roberts and those of Holt and Fales and are

9. Higgins, H. L., and Benedict, F. G.: Some Energy Factors of the Urine Excreted After Muscular Exercise, Am. J. Physiol. **28**:291 (Sept.) 1911.

10. Atwater, W. O., and Snell, J. T.: Description of Bomb-Calorimeter and Method of Its Use, J. Am. Chem. Soc. **25**:659 (July) 1903.

11. Benedict, F. G., and Higgins, H. L.: An Adiabetic Calorimeter for Use with the Calorimetric Bomb, J. Am. Chem. Soc. **32**:461 (April) 1910.

12. Wait, B., and Roberts, L. J.: Studies in the Food Requirement of Adolescent Girls: I. The Energy Intake of Well-Nourished Girls Ten to Sixteen Years of Age, J. Am. Dietet. A. **8**:209 (Sept.) 1932.

TABLE 7.—*Energy Balance Per Twenty-Four Hours, Average Six Day Periods*

TABLE 7.—*Energy Balance Per Twenty-Four Hours, Averages Six-Day Periods*

Subject	Age		Height, Cm.	Weight			Intake, Calories			Output, Calories				Absorption, per Cent	Expenditure			
				Observed, Kg.	Deviation from Baldwin-Wood Standard, per Cent	Gain or Loss per 24 Hrs., Gm.	Calculated Total	Obtained by Analysis		Urinary		Fecal			Loss in Excreta, per Cent	Basal Metabolism, per Cent	Growth and Activity, per Cent	Intake: Basal Metabolism, Ratio
	Yr.	Mo.						Total	Per Kg.	Total	Per Kg.	Total	Per Kg.					
17	13	7	138	27.94	—17.9	43	2,239	2,009	71.9	123	4.4	92	3.3	95.4	10.7	48.2	41.2	2.1
8	12	3	137	29.06	— 7.0	13	1,887	1,943	66.8	77	2.6	69	2.3	96.4	7.5	53.7	38.8	1.9
6	12	1	140	30.46	— 7.6	1	2,024	1,907	62.6	121	3.9	92	3.0	95.2	11.1	56.3	32.6	1.8
11	12	8	147	30.72	—21.8	46	1,993	1,841	59.9	122	3.9	102	3.3	94.5	12.1	62.1	25.7	1.6
13	12	9	148	32.85	—17.8	9	2,232	2,148	65.4	116	3.5	93	2.8	95.7	9.8	50.7	39.5	2.0
3	11	6	147	32.95	—13.7	13	2,174	2,058	62.4	127	3.8	135	4.1	93.4	12.7	58.5	28.8	1.7
35	13	4	144	34.45	— 8.6	107	3,032	3,434	99.6	130	3.7	148	4.3	95.7	8.1	....	....	...
12	12	8	146	35.64	— 7.4	—1	2,170	2,006	56.3	122	3.4	113	3.1	94.4	11.7	61.9	26.4	1.6
5	12	1	151	36.25	—13.1	—33	2,203	2,082	57.4	119	3.3	92	2.5	95.6	10.2	54.7	35.2	1.8
7	12	3	157	36.27	—22.8	23	2,176	2,389	65.8	106	2.9	131	3.6	94.5	9.9	53.3	36.8	1.9
15	13	2	161	37.19	—26.1	—28	2,232	2,148	57.7	118	3.1	68	1.8	96.8	8.6	61.3	30.1	1.6
20	12	8	154	37.40	—20.9	101	2,836	2,318	61.9	120	3.2	98	2.6	95.8	9.4	51.5	39.1	1.9
14	12	9	157	38.79	—18.6	27	2,167	2,342	60.3	125	3.2	104	2.7	95.6	9.8	54.9	35.4	1.8
36	13	11	153	38.93	—15.4	134	3,366	3,494	89.7	135	3.4	218	5.6	93.8	10.1	....	....	...
22	14	6	157	40.25	—20.4	42	2,977	2,845	70.7	136	3.3	106	2.6	96.3	8.5	44.7	46.8	2.2
10	12	5	144	40.66	+12.8	26	2,182	2,067	50.8	132	3.2	103	2.5	95.0	11.4	58.6	30.0	1.7
4	11	10	151	41.18	— 0.8	58	2,245	2,134	51.8	129	3.1	100	2.4	95.3	10.8	58.2	31.1	1.7
9	12	3	154	41.78	— 6.0	—19	2,116	2,006	48.2	129	3.1	104	2.5	94.8	11.6	62.9	25.5	1.6
23	14	6	154	43.83	— 9.8	52	2,464	2,274	51.9	134	3.0	72	1.6	96.8	9.1	52.1	38.9	1.9
16	13	5	167	43.94	—21.6	—27	2,304	2,304	52.4	116	2.6	85	1.9	96.3	8.8	59.1	32.2	1.7
18	14	5	167	46.80	—16.0	4	2,464	2,274	48.6	144	3.0	96	2.0	95.8	10.8	62.8	26.4	1.6
19	13	2	163	47.48	— 9.8	96	3,008	2,525	53.2	128	2.7	130	2.7	94.9	10.2	51.5	38.3	1.9
24	14	7	165	50.91	— 5.4	—44	2,115	1,837	36.1	130	2.5	92	1.8	95.0	12.1	79.5	8.5	1.3
26	15	3	162	52.89	— 1.3	137	2,315	2,309	43.6	109	2.0	142	2.7	93.9	10.9	59.9	29.3	1.7
Average	13	1	153	38.69	—12.4	33	2,372	2,279	60.2	123	3.2	108	2.8	95.3	10.2	57.1	32.6	1.8

fairly close to those of Tigerstedt.[13] However, with the exception of those of Tigerstedt and part of those of Wait and Roberts, the caloric values of the foods of all the former investigators were calculated instead of being determined by analysis, and, as is shown in table 7, calculated values generally run higher than those which are obtained by analysis. Thus, the caloric intakes reported by all the authors mentioned, with the exception of Bedale, fall within 2 per cent of our corresponding calculated values. For instance, the average total caloric intake per twenty-four hours at the age of 12, 13, 14 and 15 years in Wait and Roberts' study is 2,396, that in Holt and Fales' is 2,363, and that in Tigerstedt's is 2,338, while that in ours is 2,372 when calculated from Bradley's "Tables of Food Values" [14] and 2,279 according to the results of analysis.

The caloric loss through the kidneys is comparatively constant in the different subjects in terms of both total calories per twenty-four hours and calories per kilogram per twenty-four hours and is independent of the degree of underweight. The values are slightly higher, both for total loss per twenty-four hours and for loss per kilogram per twenty-four hours, than those reported in the previous series on undernourished children (Wang, Frank and Kaucher [15]), in which the average for calories per kilogram of body weight was 2.9, as against 3.2 in this study. As was observed in the former work with undernourished children,[15] there is a tendency to show a relation between the caloric intake per kilogram and the caloric urinary loss per kilogram. This is demonstrated by the coefficient of correlation between these two, $+0.621 \pm 0.088$, although there is little or no correlation between total intake and total urinary loss.

The caloric loss through the intestines is less constant and runs lower than the urinary loss. Based on calories per kilogram of body weight, the values are decidedly lower than those reported in the earlier work.[15] This is undoubtedly due to the difference in caloric intake per kilogram of body weight, as the children in the previous series were much younger and the caloric intake consequently higher than that in the present study. Of fifty-two subjects in the earlier series, only four had an intake of less than 70 calories per kilogram of body weight; the maximum intake was 111.5 and the minimum 56.5 calories. In the present study, the caloric intake per kilogram of body weight ranges from 36.1 to 99.6, and of the twenty-four values recorded all but two

13. Tigerstedt, C.: Untersuchungen über die Nahrungszufuhr des Menschen in ihrer Abhängigkeit von Alter, Geschlecht and Beruf, Skandinav. Arch. f. Physiol. **34**:151, 1916.

14. Bradley, A. V.: Tables of Food Values, Peoria, Ill., Manual Arts Press, 1931.

15. Wang, C. C.; Frank, M., and Kaucher, M.: Metabolism of Undernourished Children: VI. Caloric Balance, Am. J. Dis. Child. **36**:979 (Nov.) 1928.

are less than 72 calories. That the intake bears some relationship to the fecal loss is shown by the remarkable constancy in the range of the percentage of absorption, which runs between 93.4 and 96.8, averaging 95.3, a value almost identical with the percentage reported in the former study of undernourished children.[15] The coefficient of correlation between intake per kilogram and fecal loss per kilogram is $+0.527 \pm 0.104$, although that between total intake and total fecal loss is only $+0.313 \pm 0.130$. The loss per kilogram in excreta, that is, the sum of the urinary and fecal loss per kilogram, bears a marked relationship to the intake per kilogram, with a coefficient of correlation of $+0.738 \pm 0.065$, but the total intake has a very slight correlation to the total loss in excreta.

The distribution of the energy expenditure is of interest. Approximately 10 per cent of the intake seems to be lost in the excreta and 57 per cent to be used for basal production of heat, leaving a balance of approximately 33 per cent for growth, activity and "cost of digestion" in this group of adolescent girls. The amount of energy spent on growth, activity and "cost of digestion" seems to be independent of the degree to which the subjects are underweight, but it is directly influenced by the caloric intake, as is shown by the high coefficient of correlation between the two, being $+0.83 \pm 0.045$ for total calories per twenty-four hours and $+0.898 \pm 0.028$ for calories per kilogram per twenty-four hours. Our results agree with the statement of Holt and False that approximately 10 per cent of the energy value of the intake is lost in the excreta. Our average percentage for basal production of heat is higher and that for growth and activity lower than that allowed by Holt and Fales for a girl of the average weight of our girls.

Based on our findings, the total caloric requirement per twenty-four hours for an ordinary school girl between the ages of 12 and 15 years should be 1.8 times her basal heat production, as shown in table 7. This ratio is only slightly higher than that of 1.7 reported in the previous work on undernourished children.[15] When the energy value of the food is computed from standard dietary tables, 5 per cent should be added to allow for the difference between calculated food values and the values obtained by analysis, as shown in table 7. The factor by which the basal calories should be multiplied is then 1.89, and for all practical purposes 2 may be used. This use of 2 as a factor in calculating the food requirements automatically makes allowance for size, build and various abnormal conditions which influence the basal production of heat, giving a closer approximation of the actual energy requirements of the individual subject than the customary use of height, weight and age. Lucas and Pryor[16] have pointed out that slender

16. Lucas, W. P., and Pryor, H. B.: Body Build Factor in Basal Metabolism of Children, Am. J. Dis. Child. **46**:941 (Nov.) 1933.

children have a higher basal heat production per kilogram than the broad-built children. Also, a younger child has a higher energy requirement per kilogram than an older child. As an example of the use of this factor, one of our smaller girls in this group of twenty-four had a weight of 30.46 Kg., with a basal production of 35.3 calories per kilogram. If this is multiplied by the factor 1.8, the result is an estimated intake of 64 calories per kilogram. Actually this child had an intake of 63 calories per kilogram. On the other hand, one of the heavier girls, weighing 52.89 Kg., with a basal production of 26.1 calories per kilogram had an estimated intake of 47 calories per kilogram when the factor of 1.8 was used, and her actual intake was 44 calories. As evidence that this caloric allowance is adequate, the average gain in weight per twenty-four hours of this group of girls was 33 Gm., which is 3.7 times the average daily gain of 9 Gm. proposed by Baldwin-Wood for girls of this age group.

SUMMARY

The basal metabolism of thirty-four adolescent girls between the ages of 11 and 20, varied from 968 to 1,511 calories per twenty-four hours, with an average of 1,191 calories for the eighteen prepubertal and 1,317 calories for the sixteen postpubertal girls.

The averages for calories per kilogram per twenty-four hours were 33.6 for the prepubertal and 27.2 for the postpubertal girls. The corresponding averages for calories per square meter per hour were 40.2 and 37, respectively.

Nine standards were used for comparison in the prepubertal group. With five the average deviations fell within 10 per cent. The standard of Dreyer and that of Benedict and Talbot for calories per square meter per hour referred to age compared most favorably, closely followed by that of Harris and Benedict. The Girl Scouts and Aub-DuBois standards were found too high, while the Benedict standard for calories per kilogram per twenty-four hours and the Benedict-Talbot values referred to age were found too low for this group of girls.

Of the seven standards used for the postpubertal girls the Harris-Benedict standard compared most favorably. The Dreyer and Benedict-Talbot values referred to weight followed it closely. The Aub-DuBois standard was again found too high, while the Benedict standard per kilogram per twenty-four hours was found too low.

The values for basal metabolism were correlated with those for height, weight, age and surface area, using both the values in total calories per twenty-four hours and those in calories per kilogram per twenty-four hours. In the case of the total calories, the highest coefficient of correlation was that with surface area, followed closely by that with height and that with weight. When the values in calories

per kilogram were used, all the coefficients were negative, and the correlation with weight gave the highest value, closely followed by that with surface area. In this case, age gave a higher correlation than height.

The caloric intakes (based on analysis of the food intakes) of the twenty-four adolescent girls between the ages of 12 and 15 ranged from 1,837 to 3,494, with an average of 2,279. The average percentage absorbed was 95.3 and the percentage lost in the excreta, 10.2. Of the remaining caloric intake, 57.1 per cent went to basal metabolism and 32.6 per cent to growth, activity and "cost of digestion."

Of all correlations made between caloric intake and the various factors—height, weight, age, basal metabolism, urinary and fecal loss and calories for growth and activity—that with the last-mentioned factor had the highest coefficient both for the total calories per twenty-four hours and for the calories per kilogram per twenty-four hours, being $+0.83 \pm 0.045$ and $+0.898 \pm 0.028$.

The use of 2 for the ratio of intake to basal metabolism in calculating the food requirements of girls of average activity makes allowance for size, build and various abnormal conditions which influence the basal production of heat and gives a closer approximation of the actual energy requirements of the individual subject than the customary use of height, weight and age.

INFANTILE TETANY

A METABOLIC STUDY

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AND
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Instances of "infantile tetany" occurring during the first few weeks of life were reported by Kehrer [1] in 1913 and by Wolff [2] in 1918, but in no one of their cited cases were any data on chemical analysis of the blood given. Powers [3] in 1925 and Griffith in 1926 [4] were the first to report the concentration of calcium in the blood in children under 2 months of age who were suffering with convulsions not associated with rickets. The calcium content in both instances was 5.3 mg. per hundred cubic centimeters. No mention was made of the concentration of inorganic phosphorus or of the roentgen findings in the long bones. Since then many reports of a similar nature have appeared in the literature. Bass and Karelitz [5] in 1931 and McGavran [6] in 1932 reported clinically typical cases of infantile tetany occurring in the new-born, responding to calcium given orally. No chemical data were given in their reports. Cohen,[7] Guild,[8] Atlee and Tyson [9] and Maslow [10] reported similar cases. In Maslow's series more data regarding the studies of the calcium and phosphorus content of the serum were presented than in any of the preceding reports.

From the Pediatric Department, Jewish Hospital.

1. Kehrer, E.: Arch. f. Gynäk. **99**:399, 1913.
2. Wolff, B.: Arch. f. Kinderh. **66**:385, 1918.
3. Powers, G. F.: Tetany as a Cause of Convulsions in Very Young Infants, J. A. M. A. **84**:1907 (June 20) 1925.
4. Griffith, J. P. C.: Blood Calcium in Spasmophilia: Spasmophilic Manifestations in an Infant of Five Weeks, J. A. M. A. **86**:828 (March 20) 1926.
5. Bass, M. H., and Karelitz, S.: Tetany Accompanied by Hyperpyrexia and Vomiting in First Days of Life: Unusual Syndrome, J. A. M. A. **97**:1372 (Nov. 7) 1931.
6. McGavran, E. G.: Spasmophilic Tetany in New-Born, J. A. M. A. **99**:115 (July 9) 1932.
7. Cohen, P.: Tetany in Very Young Infants with Special Reference to Etiology, Am. J. Dis. Child. **45**:331 (Feb.) 1933.
8. Guild, H. G.: Internat. Clin. **3**:46 (Sept.) 1933.
9. Atlee, E. D., and Tyson, R. M.: Arch. Pediat. **47**:513 (Aug.) 1930.
10. Maslow, H. L.: Tetany in New-Born: Report of Five Cases, Arch. Pediat. **50**:768 (Nov.) 1933.

In no instance has an attempt been made to establish the etiologic factor or factors operating to cause this spasmophilic state in infants. There is, however, a general agreement among all the authors that this type of tetany is not associated with rickets.

We were unable to find any reference to an instance in which the calcium and the phosphorus metabolism were measured in a child suffering from this type of tetany.

REPORT OF A CASE

History.—The patient, a white boy 7 weeks old, was admitted to the hospital because of repeated convulsions for one day. His family history was not essential. His birth and neonatal periods were uneventful. He thrived on breast milk plus supplemental feedings of a cow's milk mixture consisting of 15 ounces (444 cc.) of milk with 5 ounces (148 cc.) of water and 4 tablespoonfuls of dextrimaltose, 3 ounces (89 cc.) of which was given after every nursing. At the age of 5 weeks orange juice and cod liver oil were added to his diet.

The illness for which he was brought to the hospital began thirty-six hours before admission. Without apparent cause, the child became irritable and cried a great deal. His temperature was normal. A few hours later, he suddenly became dyspneic and cyanotic. This was quickly followed by a severe generalized tonic and clonic convulsion, involving the muscles of the trunk and all extremities. There was frothing at the mouth. This lasted for several minutes. After a brief period of rest, the convulsive seizure returned with greater severity, and in this state the child was brought to the hospital.

Examination.—On admission the child appeared well nourished and well developed. The skin and mucous membranes were deeply cyanotic. The heart and lungs were normal. There were no signs of irritation of the meninges. The eyegrounds were normal. The ears, nose and throat showed no obvious inflammatory process. There were no clinical manifestations of rickets on examination. His temperature was normal. A complete neurologic examination several hours after the convulsion was over revealed no muscular weakness or paralysis of any of the limbs or cranial nerves. Chvostek's sign was not obtained. Erb's phenomenon was not studied. The laboratory findings were as follows: Urine examined on many occasions was normal. The blood showed a hemoglobin content of 50 per cent (Sahli), 3,400,000 red cells and 6,600 white cells. Examination of stained smears showed all the cells to be normal. The spinal fluid showed 3 cells. Sugar was present in normal amount. The reaction to Pandy's test was negative. The reaction to tuberculin was negative. The Wassermann and Kahn reactions were negative. The roentgenograms of all the long bones showed no evidence of rickets, active or healing. The calcium concentration in the blood serum was 6.5 mg. per hundred cubic centimeters, and the concentration of inorganic phosphorus was 8 mg. per hundred cubic centimeters.

It was evident that we were dealing with an instance of tetany not associated with rickets. The high concentration of inorganic phosphorus in the serum unassociated with any renal disease led us to study the calcium and phosphorus balance in the hope that it might throw some light on the mechanism of this unexplained form of tetany.

Metabolic Experiments.—The infant was given a formula of cow's milk consisting of 15 ounces (444 cc.) of milk to every 20 ounces (591 cc.) of mixture with 5 per cent dextrimaltose. The child was fed every four hours. We allowed this

regimen to continue for forty-eight hours before he was placed on the metabolism frame. The first experiment consisted of a preliminary period of three days, during which the formula was all the child received. His intake of milk was carefully measured. No vomiting or diarrhea disturbed this period. The output of urine and stools was carefully collected. We employed carmine to check the beginning and the end of the period. Determinations of creatinine in the urine were made daily to assure complete collections. The calcium and phosphorus contents of the milk taken were determined, the former by the method of McCrudden[11] and the latter by that of Fiske and Subbarow.[12] The calcium and phosphorus output in the urine and stools were similarly studied. During this period the child had numerous convulsions.

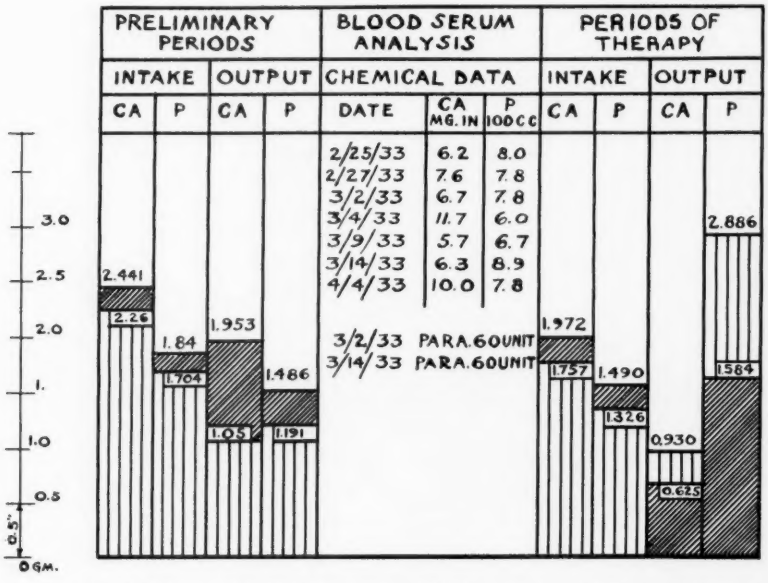

Chart 1.—Calcium and phosphorus metabolism and calcium and phosphorus content of the blood in a case of nonrachitic tetany during preliminary periods in which no treatment was given and during periods of treatment with parathyroid extract. During the first preliminary period, the calcium balance was + 1.21 Gm. and the phosphorus balance + 0.153 Gm. During the second preliminary period, the calcium balance was + 0.488 Gm. and the phosphorus balance 0.354 Gm. During the first period of therapy, the calcium balance was + 0.827 Gm. and the phosphorus balance — 1.56 Gm. During the second period of therapy, the calcium balance was + 1.347 Gm. and the phosphorus balance — 0.094 Gm. The first period is indicated by vertical shading; the second is indicated by diagonal shading.

This period was followed by one, which also lasted three days, during which the infant received the same formula but was also given 5 units of parathyroid

11. McCrudden, F. H.: J. Biol. Chem. **7**:83, 1910.
12. Fiske, C. H., and Subbarow, Y.: J. Biol. Chem. **66**:375 (Dec.) 1925.

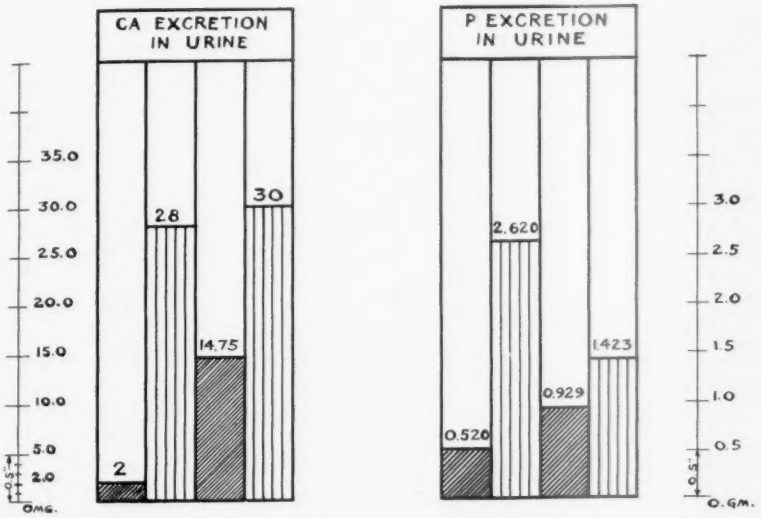

Chart 2.—Urinary excretion of calcium and phosphorus before and after treatment with parathyroid extract. The period before treatment is indicated by diagonal shading. The period after treatment is indicated by vertical shading.

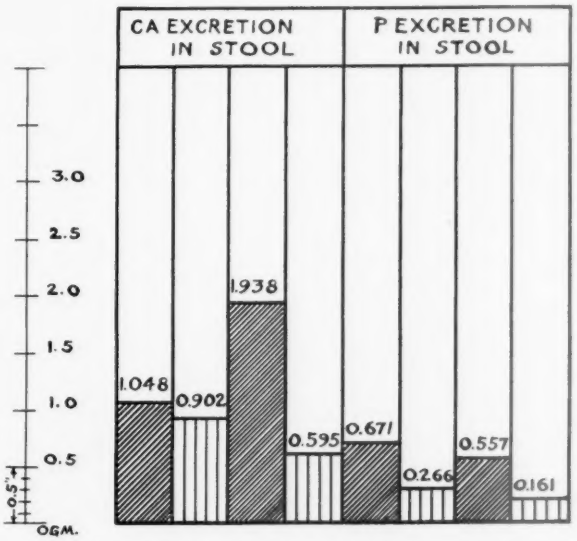

Chart 3.—Excretion of calcium and phosphorus in the feces before and after treatment with parathyroid extract. The period before treatment is indicated by diagonal shading, and the period after treatment is indicated by vertical shading.

extract intramuscularly every four hours. No convulsions occurred during this period. Studies on the calcium and phosphorus intake and output were made as in the preliminary period.

After a rest period of several days the experiment was repeated. No parathyroid extract was given during the rest period, and the convulsions returned.

In both preliminary and therapeutic periods the second experiment was made in a manner identical with that of the first experiment.

The concentrations of calcium and inorganic phosphorus in the serum were determined at the beginning and at the end of every period.[13]

During the first preliminary period we found that practically no calcium was excreted in the urine (chart 2). The excretion of calcium in the feces was normal (chart 3). However, the fecal excretion of phosphorus was tremendously increased (chart 3), while the urinary excretion was rather low (chart 2).

During the first period of treatment with parathyroid extract, we found a striking increase in the urinary output of calcium, while the fecal output remained practically unchanged (chart 2). The urinary excretion of phosphorus was sharply increased, while the fecal output showed a marked diminution.

Similar results were noted in our second experiment, with the remarkable exception that the fecal excretion of calcium was high in the preliminary period and rather low in the period during which parathyroid extract was administered. In both experiments the most striking changes seem to be concerned with the partition of the phosphorus rather than with that of the calcium.

A positive calcium and phosphorus balance was obtained in both preliminary periods (chart 1).

During the periods when parathyroid extract was administered, the calcium balance remained positive, while a striking negative balance of phosphorus was found. This was more marked in the first than in the second experiment.

COMMENT

Studies of calcium and phosphorus metabolism in cases of hypoparathyroidism have been made by Aub and his co-workers.[14] This work was done either on adults suffering from idiopathic parathyroprivia or on those who had lost their parathyroid glands as a result of thyroidectomy. In summarizing their work they noted that in tetany due to parathyroprivia, the calcium concentration in the blood is about half that of normal blood or less and the phosphorus concentration in the serum is high. They observed that in a person on a low calcium diet the urinary excretion of calcium is low and the fecal excretion essentially normal. The excretion of phosphorus was found to be lower than in normal persons. The excretion of phosphorus in the urine is markedly reduced. The excretion of phosphorus in the feces is essentially normal. From these findings they concluded that a high partition

13. Kramer, B., and Tisdall, F. F.: J. Biol. Chem. **47**:475, 1921.

14. Aub, J. C.; Albright, F.; Bauer, W., and Rossmeisl, E.: Studies of Calcium and Phosphorus Metabolism: VI. In Hypoparathyroidism and Chronic Steatorrhea with Tetany with Special Consideration of the Therapeutic Effect of Thyroid, J. Clin. Investigation **11**:211 (Jan.) 1932.

of phosphorus in the urine is one of the most important characteristics of hypoparathyroidism.

Their findings are similar to those noted in our case during the preliminary period. Our patient was an infant whose serum calcium content on admission was 6.2 mg. per hundred cubic centimeters and whose serum phosphorus was 8 mg. per hundred cubic centimeters, which gives a calcium-phosphorus product of nearly 50, which is well within the zone of normal calcification. The roentgenogram of the bones showed no rachitic changes. The excretion of calcium in the urine was almost negligible, i. e., 2 mg. (chart 2). The excretion of calcium in the feces was normal. The urinary excretion of phosphorus was rather low, and the fecal excretion was within normal limits. When parathyroid extract was administered, there was a remarkable alteration in the findings (charts 2 and 3). The serum calcium rose to 11.7, and the phosphorus was reduced to 6 mg. per hundred cubic centimeters. There was a striking increase in the urinary elimination of phosphorus and a reduction in the fecal excretion. The urinary excretion of calcium increased, but the fecal excretion was almost unaltered (charts 2 and 3).

As soon as the administration of parathyroid extract was discontinued, the serum calcium content returned to 5.7 mg. per hundred cubic centimeters, and the serum phosphorus rose to 6.7 mg. per hundred cubic centimeters. The convulsions, which had ceased during the period of treatment, returned.

When the experiment was repeated, similar but less striking results were obtained.

It seems, therefore, that the metabolic reactions in our case approach those described by Aub as occurring in hypoparathyroidism. There is, however, this difference. In all his patients the condition remained unchanged. Those who did not die remained unimproved. In our case the baby, after having received 120 units of parathyroid extract during the metabolic studies, improved spontaneously (i. e., without any further treatment). The calcium concentration in the blood serum remained above the "tetany level." The convulsions ceased. His progress was watched for well over a year, and repeated chemical analyses of his blood for the calcium and phosphorus concentrations have revealed a persistence of normal values. Roentgen studies of his long bones made during the past year showed no metabolic changes at the epiphyses.

We therefore suggest that this infant suffered a temporary disturbance in the internal secretion of the parathyroid glands, causing tetany due to a low calcium concentration and unassociated with rickets, responding dramatically to treatment with parathyroid extract and recovering completely without any further evidence of any metabolic disturbance.

SUMMARY

A case of infantile tetany unassociated with rickets is reported.

A study of the calcium and phosphorus metabolism of the patient revealed a striking resemblance to the findings of Aub and his co-workers in their studies on idiopathic parathyroprivia, i. e., a high partition of phosphorus in the urine.

The child responded favorably to the administration of parathyroid extract.

After the administration of 120 units of parathyroid extract, the child made a complete recovery from the apparent temporary dysfunction of the parathyroid glands without any further treatment and has remained normal for nearly two years.

RESPIRATION IN INFANCY

II. A STUDY OF RATE, VOLUME AND CHARACTER OF RESPIRATION IN HEALTHY INFANTS DURING THE NEONATAL PERIOD

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JAMES P. HANNER, M.D.
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This study is a continuation of the work reported previously by one of us (J. D.) and Washburn.[1] The purpose of this investigation was to study intensively the rate, volume and character of the respirations during the neonatal period and the variations seen in the same infant from day to day.

The method, apparatus and technic used in this study were the same as those described in the previous article.

SUBJECTS

The subjects of this study were eighteen healthy new-born infants from the nursery of the Colorado General Hospital. Tracings of the respirations of each infant were obtained at some time during the first twenty-four hours after birth and then each day subsequently until the child was discharged from the hospital, usually on the tenth day.

An attempt was made each day to obtain a satisfactory record of the child's respirations during quiet sleep, during a period in which the child was awake and quiet and during a crying spell. Each child was examined carefully so as to eliminate abnormal infants from the study. There were no evidences of abnormality in any of the infants reported on in this study. Their weights ranged from 5 pounds and 9½ ounces to 7 pounds and 15 ounces (from 2,537 to 3,590 Gm.). There were 9 boys and 9 girls. The group included 14 white infants, 3 Mexican and 1 Negro. All were full term infants.

ANALYSIS OF RECORDS

The outstanding characteristic of respiration in these normal infants, as shown in the previous article, was the extreme variability of type, rate and volume in different infants of the same age as well as in the same infant from day to day and even from minute to minute.

From the Child Research Council and the University of Colorado School of Medicine.

1. Deming, Jean, and Washburn, Alfred H.: Respiration in Infancy: I. A Method of Studying Rates, Volume and Character of Respiration with Preliminary Report of Results, Am. J. Dis. Child. **49**:108 (Jan.) 1935.

Character of Respiration During Sleep.—The kind of respiration observed could be divided into two general types: the regular and the periodic. The regular type of respiration includes all forms in which the volume of all inspirations on a tracing is approximately equal. The form of regular respiration most commonly observed was that in which the duration of inspiration and of expiration was approximately the same and in which inspiration followed expiration without any definite pause (fig. 1*C*). Depending on the rate and depth of the inspirations, the tracings showed considerable variation. (Contrast the rather rapid form of the regular type in fig. 1*C* with the slow form in fig. 1*D* and *E*.) As a minor variation of the regular type an M form was seen occasionally. In this form the inspirations were equal in height but the expirations alternated between shallow and deep waves. There was no record in which the M form persisted for more than a few seconds.

A very definite variation of the regular type of respiration was the so-called cogwheel type, in which a rapid inspiration is followed by a prolonged and interrupted expiration without appreciable pause between expiration and inspiration (fig. 2*A*). Although this type of respiration was usually rather slow in rate, records were obtained of definite cogwheel respiration in which the rate per minute was quite high. The most rapid was 78 respirations per minute. Here, again, the form of the tracing may show considerable variation dependent on rate and volume of inspiration.

The second general type, the periodic, was characterized by a waxing and waning of the amplitude of the inspiratory excursion in recurring cycles. Two general subdivisions of this type were observed, one resembling Cheyne-Stokes respiration, in which the cycles were separated by complete periods of apnea, and the other showing no periods of apnea between the cycles. The rapidity of the occurrence of the cycles varied considerably. In figure 1*D* and *E* are shown examples of extremely slow periodicity.

Considerable overlapping and mixing of the types were observed; for example, one record was observed in which the rhythm was periodic, the respirations with the high amplitudes were of the cogwheel variety and the ones with low amplitudes were of the type in which inspiration and expiration were equal in duration. We observed another record in which just the opposite was true; that is, the respirations with short amplitudes were of the cogwheel type and the high ones of the type without prolonged expiration.

We noted a few tracings of bizarre forms similar to those described in the previous article, which defied classification (see figure 4 of that article [1]).

Owing to overlapping and mixing, it was impossible to determine exactly the distribution of the various types. An attempt at a somewhat arbitrary classification showed the following facts: Of 336 records obtained while the infants were asleep and fairly quiet, 193 showed at least some period of regular respiration (not including the cogwheel

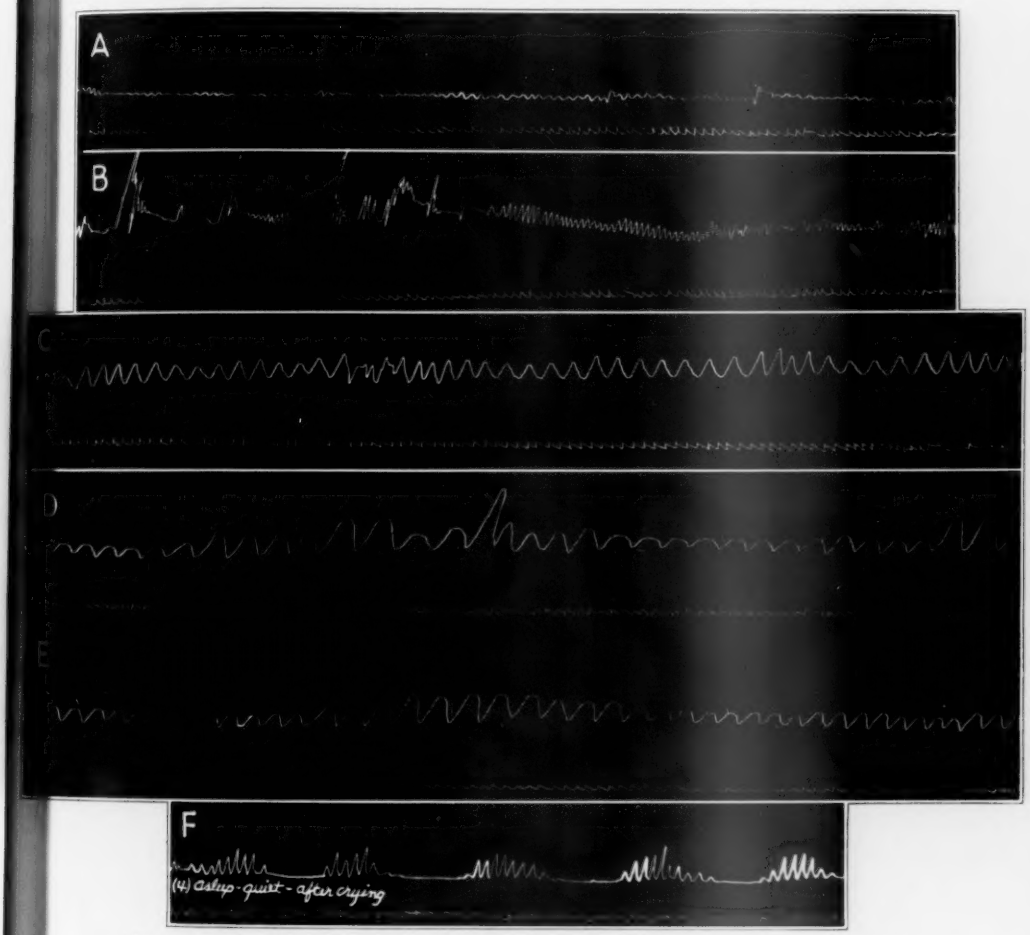

Fig. 1.—*A*, tracing of the minimum respiratory excursions for Baby R on the fourth day of life while asleep. *B*, tracing for Baby R obtained immediately after that shown in *A* (awake and crying at first; then quiet). *C*, tracing for Baby Q on the seventh day of life, illustrating average regular breathing during sleep. *D* and *E*, successive tracings for Baby S on the second day of life, showing, first, slow type with rounded peaks and, second, an example of slow periodicity (asleep). *F*, tracing for Baby N, on the ninth day, illustrating extreme periodicity of the Cheyne-Stokes type during quiet sleep.

type), 64 the cogwheel type, 58 the periodic type without apnea and 45 the periodic type with apnea; 8 fell in the unclassified group.

When these records were distributed according to day of life, it was observed that periodic breathing occurred more frequently toward the end of the neonatal period. No instance of periodic respiration was observed during the first twenty-four hours of life. On the other hand, the cogwheel type of respiration was observed more frequently during the first few days than later. There is apparently no correlation between depth of sleep and type of respiration. Periodic respiration was observed frequently after a period of restlessness in which the respiration had been regular previously. We observed instances in which as the depth of sleep apparently increased there was a change from the regular to the periodic type.

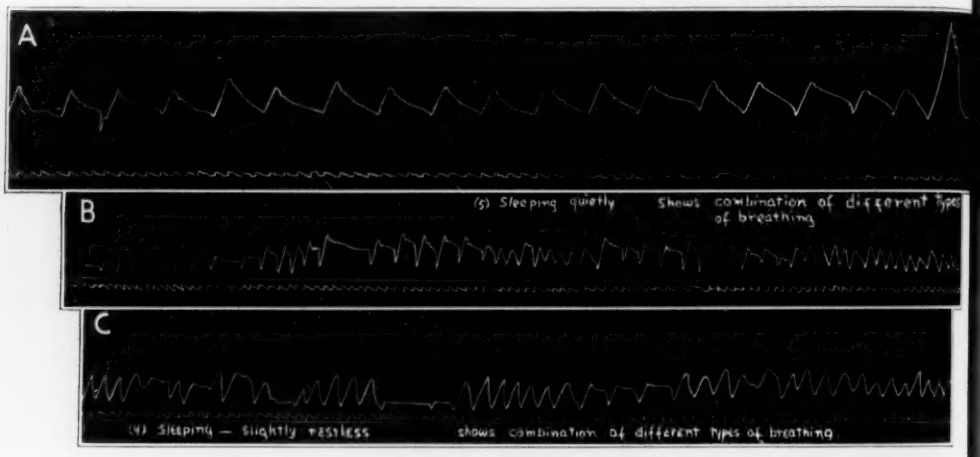

Fig. 2.—*A*, slow cogwheel type of breathing shown in tracing for Baby T, during quiet sleep on the day of birth. *B* and *C*, tracings for babies D and G, each obtained on the fifth day, illustrating mixtures of regular, cogwheel and periodic types.

The type of respiration in individual babies varied a great deal from day to day. In only 2 infants was there a consistent type (the regular) throughout the period of observation. In another a very slow type of respiration consistently appeared, which, however, at times would be regular and at times periodic, with very slow cycles (fig. 1*D* and *E*).

Rate of Respiration During Sleep.—From the 336 records obtained during sleep, 141 records obtained on 108 different days were selected for detailed study of rate and volume. Representative samples for minute and one-half minute periods were taken and the rate per minute counted. Satisfactory records for study were obtained from 13 infants in the first twenty-four hours of life, 13 during the second day, 13

during the third day, 10 during the fourth day, 12 during the fifth day, 6 during the sixth day, 10 during the seventh day, 12 during the eighth day, 10 during the ninth day, 7 during the tenth day and 2 during the eleventh day.

The average rate and its range and distribution are given in table 1. When these figures are compared with those reported by Deming and

TABLE 1.—*Determinations of Rate and Volume Based on 141 Tracings of Respiration*

	Rate per Minute		Average Depth of Inspiration, Cc.		Volume per Minute of Inspired Air, Cc.		Volume per Pound per Minute of Body Weight, Cc.	
Range	16 to 93		9.7 to 30.5		225.0 to 1,835.1		38.1 to 248.1	
Average	44		19.8		851.1		127.3	
Distribution	Rate	Samples	Average Depth	Samples	Volume	Samples	Volume	Samples
	10 to 19	1	Less than 10	1	Less than 500	8	Less than 50	1
	20 to 29	18	10 to 19	69	500 to 999	103	50 to 99	18
	30 to 39	42	20 to 29	70	1,000 to 1,499	25	100 to 149	72
	40 to 49	36	30 to 39	1	1,500 to 1,999	5	150 to 199	16
	50 to 59	28					200 to 249	4
	60 to 69	6						
	70 to 79	6						
	80 to 89	3						
	More than 90	1						

TABLE 2.—*Rate and Volume of Respiration According to Days of Life After Birth*

Age in Days	Rate per Minute		Depth of Inspiration, Cc.		Volume per Minute, Cc.		Volume per Pound per Minute, Cc.	
	Range	Average	Range	Average	Range	Average	Range	Average
1*	16 to 59	41	9.7 to 26.7	18.7	225.0 to 1,186.9	734.0	38.1 to 190.4	106.0
2	27 to 82	43	11.6 to 24.9	18.3	436.1 to 1,703.9	757.3	Only 1 sample	231.0
3	23 to 66	40	12.2 to 29.8	19.5	465.0 to 1,003.2	816.8	94.2 to 142.8	123.3
4	26 to 66	43	11.3 to 24.2	19.0	581.7 to 1,095.2	771.1	98.5 to 160.1	120.5
5	25 to 70	41	15.2 to 26.1	19.1	550.0 to 1,452.5	776.4	92.0 to 215.2	115.1
6	26 to 51	40	10.9 to 29.8	19.7	561.1 to 900.9	781.9	93.8 to 139.0	122.4
7	28 to 59	44	14.3 to 22.9	18.9	490.2 to 1,222.0	943.4	70.3 to 170.0	120.3
8	27 to 85	45	17.6 to 28.9	22.3	671.7 to 1,835.1	983.4	97.4 to 248.8	141.0
9	32 to 80	49	13.4 to 26.8	20.9	681.5 to 1,663.2	987.8	110.9 to 236.5	146.9
10	32 to 93	57	15.7 to 30.5	21.8	909.9 to 1,483.9	1,154.6	123.9 to 206.9	159.0
11	32 to 72	46	24.7 to 25.2	24.9	806.2 to 1,774.3	1,143.7	Only 2 samples 110.4 and 116.5	113.5

* Day of birth.

Washburn, it is seen that the average rate is 44 per minute as compared to 41 per minute, and that the range is wider. This is to be expected since we were dealing with younger infants. When the rates for all 18 babies were averaged according to the day of age, there seemed to be a tendency for the rate to increase after the first five or six days of life (table 2). When, however, the figures for individual babies were examined, this tendency was not so apparent.

Increased depth of sleep tended to produce a slower rate. This may explain why the average rate was somewhat lower during the first

five or six days than later. The infants slept more readily and were less restless during the first few days after birth than later.

Table 3 shows the average rate seen in various types of respiration. In compiling this table only those records were used which showed fairly definite types. The records in which there was mixing of types were discarded. The cogwheel type was the only one which showed a definitely slower rate than the average of the whole group. The periodic type with apnea showed, as might be expected, a definitely slower rate than the periodic type without apnea.

In the previous article [1] attention was called to an apparent difference in the average rates seen in the two sexes. Deming and Washburn

TABLE 3.—*Rate and Volume of Respiration According to Type of Respiration*

Type	Number of Samples	Average Rate per Minute	Average Depth of Inspiration, Cc.	Average Volume per Minute, Cc.	Average Volume per Pound per Minute, Cc.
Regular (not including cogwheel)...	74	46	19.7	883.6	132.2
Cogwheel.....	16	33	23.0	743.5	111.4
Periodic (both forms).....	48	45	19.7	858.6	129.2
Periodic with apnea.....	23	42	21.1	861.2	125.8
Periodic without apnea.....	25	48	18.5	856.2	132.3
All types combined.....	141	44	19.8	851.1	127.3

TABLE 4.—*Rate and Volume of Respiration According to Sex*

Sex	Average Rate per Minute	Average Depth of Inspiration, Cc.	Average Volume per Minute, Cc.	Average Volume per Pound per Minute, Cc.
Boys.....	39	21.7	819.4	126.9
Girls.....	49	18.2	878.1	127.6
Both sexes.....	44	19.8	851.1	127.3

found that the boys had an average rate of 43 per minute and the girls of 36 per minute. In the present series we found that the boys had an average of 39 and the girls of 49 (table 4). It seems from this that if we obtained a larger series the rates would probably show no difference in the sexes. No correlation was observed between body weight and respiratory rate per minute.

Volume Inspired During Sleep.—The method of determining the volume of inspired air was the same as that described in the previous article. The range, average and distribution of inspired air per minute are given in table 1.

The average volumes of inspired air according to types of respiration are given in table 3. The average volume of inspired air per minute was noted to be somewhat lower in the cogwheel type than in the other types and the average inspiration during a sample minute somewhat

deeper. As pointed out in the previous article, there is roughly an inverse ratio between the depth of inspiration and the rate. When the average volume per minute was distributed according to days, a tendency was observed for the volume per minute to increase with increasing age (table 2). Not included in these tabulations was one record obtained on a baby while asleep and quiet during the first day of life in which the excursions were extremely shallow, with long periods of apnea. This record which followed a period of crying was similar to one seen in another baby while it was asleep and quiet, as

TABLE 5.—*Rate and Volume of Respiration of Infants While Awake and Quiet, Based on 265 Samples*

Rate per Minute		Average Depth of Inspiration, Cc.		Volume per Minute, Cc.		Volume per Pound per Minute, Cc.	
Range	Average	Range	Average	Range	Average	Range	Average
30 to 120	61.3	8.1 to 39.2	20.4	369.4 to 3,115.5	1,207.4	54.7 to 375.5	183.5

TABLE 6.—*Comparison of Average Rate and Volume of Respiration in 6 Infants While Asleep and While Awake*

	Infant					
	A	H	I	L	P	S
Average rate per minute						
Asleep	46	63	33	39	59	29
Awake	72	77.6	36	56	66	45
Average depth of inspiration, cc.						
Asleep	18.8	17.8	26.0	18.6	22.2	19.1
Awake	16.9	20.6	27.8	17.7	28.1	21.2
Average volume per minute, cc.						
Asleep	825.6	1,123.5	839.5	719.5	1,319.7	598.4
Awake	1,162.5	1,553.8	2,434.2	982.3	1,496.4	974.7
Average volume per minute per pound, cc.						
Asleep	103.5	168.9	112.9	96.2	167.7	104.5
Awake	171.0	209.1	129.7	139.0	192.1	202.3

illustrated in fig. 1 *A*. This was not included because it showed such marked variations from the other records obtained on this child later and on the other children that we feared that there was some fault in the apparatus, though none was found. On this record the rate was 34 per minute, the average depth of inspiration 6 cc., the total volume per minute 205.8 cc. and the volume per pound per minute 36.3.

Respiration While Awake and Quiet.—Two hundred and sixty-five records were obtained on the infants while they were awake and fairly quiet. Of these, 127 samples were analyzed for rate and volume. The results are shown in table 5. If these are compared with the records obtained during sleep (table 1), it will be noted that the average rate, volume per minute, and volume per pound per minute are higher. In

TABLE 7.—*Maximum Excursion in Cubic Centimeters for Each Baby While Crying on Each Day of Observation* *

Day of Life	Infant																	
	A	B	C	D	E	H	I	J	K	L	M	N	O	P	Q	R	S	T
1†	122.4	95.4	76.5	159.9	113.8	116.7	132.8	105.6	104.4	95.9	116.7	111.1	125.7	101.2	87.5	145.5	118.3	102.3
2	128.2	92.2	79.2	170.9	**121.0**	124.7	135.1	**146.0**	108.8	101.4	117.6	80.1	137.7	115.7	95.2	113.9	**135.1**	121.5
3	136.3	105.1	100.3	110.0	102.1	112.1	100.0	128.4	112.3	.....	121.0	111.3	125.4	128.2	100.5	116.9	118.7	107.9
4	**138.1**	128.2	108.6	**181.1**	.....	.....	121.3	.....	**130.5**	127.3	.....	.....	.....	128.7	.....	126.4	111.1	**129.6**
5	128.7	114.1	118.5	115.0	114.8	115.0	112.5	145.3	100.7	120.4	110.0	100.7	133.3	116.4	.....	.....	.....	132.1
6	.....	122.9	93.8	**147.6**	113.7	103.7	127.5	.....	118.5	.....	123.1	96.6	143.7	.....	102.7	134.0	128.9	.....
7	113.9	**140.0**	94.2	.....	92.6	98.9	132.8	115.5	.....	114.8	**140.9**	.....	135.6	133.5	103.3	137.7	131.4	.....
8	120.6	110.0	101.2	96.6	111.6	**133.3**	**137.0**	139.8	110.6	**142.3**	122.0	104.9	**173.3**	**138.6**	104.7	147.8	125.9	125.7
9	127.0	.....	**143.0**	178.6	.....	113.7	106.0	138.6	92.2	141.1	125.4	**121.3**	167.9	132.8	101.9	132.6	113.2	**141.1**
10	127.3	.....	.....	101.4	112.3	127.3	124.7	124.3	102.8	136.8	.....	101.6	172.3	124.5	**122.4**	**149.5**	.....	126.8
11	115.0	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	107.0	.....	113.0	.....	.....	.....	120.6

* The greatest excursion obtained on each baby appears in boldface type.
† Day of birth.

order to show the difference more accurately, a comparison was made between records obtained during sleep and while the infant was awake on the same day, on five or more days during the period of observation (table 6). Here the average rate, volume per minute, and volume per pound per minute were always higher when the infant was awake. Occasionally there were records, however, in which the rate of the child while he was asleep was higher than that while he was awake. For example, baby I on the fourth day of life had a rate of 30 while awake and 34 while asleep. However, in this case the volume per minute was 1,147.8 cc. while the child was awake and 666.7 cc. while he was asleep.

The types of respirations observed while the children were awake followed roughly those seen while they were asleep. They were, however, less definite, and the periodic types, especially with apnea, were far less numerous.

Respiration During Crying.—It was felt that perhaps if the maximum excursions obtained during periods of crying were measured, we could obtain an approximation of the vital capacity of the infant. The maximum excursion obtained each day for each of the 18 babies over their period of observation is given in table 7. It is interesting to note that in several of the babies studied the maximum inspiration obtained during crying on the first day of life was as great or greater than the maximum inspiration obtained on the tenth or eleventh day of life.

SUMMARY

There is marked variation in the respiratory rate, rhythm and volume during the first eleven days of life.

A study of 141 tracings on 18 healthy new-born infants during sleep, over a period of eleven days, yielded the following figures: rate from 16 to 93 per minute, average 44; range of average inspiratory depths in any one infant during a sample minute, from 9.7 to 30.5 cc., average 19.8 cc.; volume per minute of inspired air, from 225.0 to 1,835.1 cc., average 851.1 cc.; volume of inspired air per minute per pound of body weight, from 38.1 to 248.1 cc., average 127.3 cc.

There is a tendency for the volume of inspired air to increase during the first ten days of life.

The respiratory rate and the volume of inspired air per minute are greater while the infant is awake than while it is asleep.

It is suggested that an approximation of vital capacity may be obtained in infancy by measuring the maximum inspiration obtained while the child is crying.

Jane Waldo aided in measurement of the records.

Case Reports

HEMATOCOLPOS DUE TO IMPERFORATE HYMEN

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Puberty as a field for specialized study has received scant attention. The amount of available clinical data applicable to this important period of life is decidedly small in comparison with the corresponding advances in other fields of medicine. The overlapping between the specialties of internal medicine and pediatrics during these years has retarded the development of intensive study of this period by either group, and this age period has been aptly called a "no man's land." The pediatrician is particularly well adapted to assume responsibility in dealing with the problems of the adolescent child as he knows the entire previous background of the child. It therefore is fitting that he should acquaint himself better with the various aspects of puberty. With these ideas in mind, we take the privilege of calling to the attention of pediatricians a condition more familiar to gynecologists, namely, hematocolpos due to imperforate hymen.

The onset of menstruation, an outstanding feature in this period of rapid growth and development, may be interfered with by an imperforate hymen. After menstruation has begun, the retention and accumulation of menstrual blood produces a characteristic group of symptoms and signs. Hematocolpos may result and may be associated with hematometra, hematosalpinx and even pelvic peritonitis.

ETIOLOGY

The textbooks on pediatrics either do not mention this clinical entity or make only passing mention of it. There have been no articles relating to the subject in pediatric journals for at least eighteen years. As a gynecological condition it has received adequate treatment in the textbooks on gynecology, and most of the case reports have appeared in foreign gynecological literature.

Read before the Chicago Pediatric Society, Dec. 17, 1935.

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An estimation of the frequency of this condition from a review of the literature alone would be misleading. Since 1917 only twenty-eight cases have been reported, twenty-six of which are herewith tabulated and commented on. Erdmann [1] saw only two cases in his extensive surgical experience of twenty-seven years. Gordon [2] found records of eleven cases of imperforate hymen observed at the Bellevue Hospital, New York, in the twenty year period from 1911 to 1931; he makes no mention of the incidence of accompanying hematocolpos.

One of us (J. K. C.) recently encountered the first case to come under his observation during nine years on the staff of the Cook County Children's Hospital. He consulted Dr. Joseph Brennemann [3] regarding the frequency of the condition, who stated that he had seen only one case of hematocolpos due to imperforate hymen, and that was observed about two years ago at the Children's Memorial Hospital. Assuming from these facts that the condition is rare, we reviewed the records at

TABLE 1.—*Distribution of Records of Forty Cases of Hematocolpos Due to Imperforate Hymen*

		Cases
Literature since 1917		26
Additional cases reviewed by authors:		
Michael Reese Hospital	7 since 1912	14
Cook County Hospital	5 since 1933	
Illinois Educational and Research Hospital	1 since 1933	
Children's Memorial Hospital	1	

the Cook County and Michael Reese hospitals, which, much to our surprise, revealed that four additional cases of imperforate hymen associated with hematocolpos had been observed at the former in the past two years and six cases at the latter since 1912. In addition, one case was observed at the University of Illinois Research and Educational Hospital within the past two years (table 1). Since this review, one of us (J. K. C.) has seen another case in the gynecological service at the Michael Reese Hospital. The discrepancies in the apparent incidence of the condition can be accounted for as follows: Most hospitals for children do not ordinarily admit patients over 12 years of age, whereas the predominant age at which this clinical entity is first discovered is 14. Patients with this condition consequently slip into the gynecological wards and are seen only by gynecologists. Thus, to the gynecologist the syndrome associated with imperforate hymen and hematocolpos appears to be fairly well known and not particularly

1. Erdmann, J. F.: Internat. Clin. **3**:130, 1918.

2. Gordon, Onslow A., Jr., in Curtis, A. H.: Obstetrics and Gynecology, Philadelphia, W. B. Saunders Company, 1933, chap. 91.

3. Brennemann, J.: Personal communication to the authors.

uncommon, whereas in the experience of the pediatrician or the general practitioner the condition may be rare, if not entirely unknown.

The distribution of the cases reviewed with reference to ages shows that the predominant age at which this clinical entity is first discovered is as stated, 14 (table 2). Fifteen of the forty cases occurred at this age, an incidence of 38 per cent. Eleven cases occurred between the ages of 12 and 14. Thus there were altogether twenty-six cases out of a total of forty, or 65 per cent, in which symptoms occurred before the age of 15. These facts reemphasize the importance of an acquaintance with a syndrome the incidence of which is highest within an age period that should be the diagnostic domain of the pediatrician, although treatment should most certainly be in the hands of the gynecologist.

TABLE 2.—*Distribution of Forty Cases of Hematocolpos According to Age*

Age	12	13	14	15	16	17	18	19	20
Cases	6	5	15 (38%)	3	6	1	3	..	1

TABLE 3.—*Incidence of Urinary Symptoms and of Abdominal Mass in Forty Cases of Hematocolpos*

	Cases	Percental Incidence
Retention of urine	15	38
Dysuria	3	20
Frequency of urination	3	
Nocturia	2	
	23	58
Abdominal mass	15	38

PATHOGENESIS

Several theories have been offered in explanation of the presence of an imperforate hymen. They are thoroughly discussed in any textbook on gynecology. Although the abnormality occurs most commonly as a congenital defect, in some cases it may result from an inflammatory reaction in infancy. In most of the cases, an imperforate hymen causes no disturbance during childhood, although a few have been reported in which the accumulated nonhemorrhagic secretions have necessitated perforation before the onset of menstruation. It is especially during the early years of puberty, however, that the retention of the menstrual blood above the hymeneal membrane leads to a condition which requires investigation and then surgical treatment. As the collection of menstrual blood increases in amount the vagina becomes distended (hematocolpos) and then the uterus (hematometra) and even the tubes (hematosalpinx).

A cystic mass is formed, consisting of the contents of the vagina and uterus, which may extend above the symphysis; then it may be seen and palpated abdominally.

That there is a form of imperforate hymen which results from the plastic healing of inflammatory processes in infancy and early childhood has been advocated by Veit,[4] Graves [5] and others. Various forms of irritation, trauma and infection, by injuring the epithelial layers of the very delicate mucous membrane of the lower genital tract may give rise in the process of repair to the formation of an atretic membrane over the vaginal introitus. However, only a few cases have been recorded in which such a factor actually led to the production of an imperforate hymen. In Villaca's [6] case of imperforate hymen with hematocolpos (case 25, table 4), there was a history of an abscess around the vulva at the age of 5 years, and during the evolution of the abscess the child was unable to urinate. It is questionable here whether the imperforate hymen discovered at puberty was of congenital origin or the result of cicatrization. Areta [7] reported three cases of hematocolpos and hematometra due to hymeneal synechiae (cases 10, 11 and 12, table 4). In two of the cases the appearance of the membrane and the presence of a network of blood vessels crossing it, together with the history of a few menstrual periods, are sufficient, in his opinion, to classify these cases as examples of the acquired type of imperforate hymen. He maintained that prolonged erotic traumatism or prolonged irritation due to lack of vulvar hygiene produces erosion of the hymeneal borders leading to the formation of true synechiae. However, in most cases the imperforate hymen is a congenital defect or anomaly. Such a defect may be associated with other defects of the external genitalia, such as partial or complete atresia of parts of the vagina. An example of the latter condition is found in case 3a (table 5).

SYMPTOMS

As a consequence of the damming back of the retained menstrual blood there develops a rather characteristic group of symptoms and signs in which abdominal pain and swelling, often accompanied by urinary symptoms, are most prominent.

With few exceptions, complaints of abdominal pain have been made in every reported case of hematocolpometra due to an imperforate hymen. The discomfort is invariably located in the lower half of the

4. Veit, W. P., cited by Graves.[5]

5. Graves, W. P.: Textbook of Gynecology, Philadelphia, W. B. Saunders Company, 1928.

6. Villaca, O.: Rev. de gynec. e d'obst. **27**:302 (Aug.) 1933.

7. Areta, L.: Semana méd. **2**:237 (July 26) 1928.

TABLE 4.—*Data on Cases of Hematocolpos Due to Imperforate Hymen Reported Since 1917*

Case	Author	Age	Complaints			Physical Findings			Treatment
			Abdominal	Urinary	Miscellaneous	Abdominal	Rectal	Vulval	
1	Wiener: Am. J. Obst. & Gynec. **75**: 398 (March) 1917	12	Mass in lower part of abdomen of 8 days' duration	Unable to urinate, with retention for 8 days	No menses; catheterization several times	Mass in lower part of abdomen	Mass bulging into lumen of bowel	Hymen imperforate, bulging	Hymen excised; 30 oz. (57.3 cc.) yellow turbid fluid
2	Keiler: Ugesk. f. læger **79**: 1538 (Sept.) 1917	16	Abdominal pain for 1½ years; abdominal mass for 6 months	.....	No menses	Mass in lower part of abdomen 2 finger-breadths below umbilicus	Mass in region of vagina and uterus	Hymen imperforate, bulging	Hymen excised; 800 cc. chocolate fluid released, laparotomy for ruptured hematosalpinx on left side
3	Erdmann [1]	14	.....	Dysuria and urinary retention	No menses; catheterization required	.....	.....	Tumor mass; bulging	Hymen incised; catheterization yielded 2 qt. or 1,890 cc.
4	Palmer: J. Florida M. A. **12**: 99 (Oct.) 1925	15	Discomfort in lower part of abdomen	Urinary retention for 24 hours	.....	Size and contour like those at 5-6 months' pregnancy	.....	Imperforate hymen	Hymen incised; 1 pt. (470 cc.) fluid escaped
5	Nasiruddin: Indian M. Gaz. **61**: 232 (May) 1926	18	Pain in lower part of abdomen and back	Urinary retention for 4 days	Amenorrhea; fever for 2 weeks; unable to stand or walk freely	Soft pyriform swelling the size of a coconut and extending up to the umbilicus	.....	Soft tumor protruding from vulva; thick imperforate hymen	Hymen incised, 2 pt. (945 cc.) chocolate-colored fluid escaped; catheterization (8 oz. or 235 cc.)
6	Quintana: Rev. de especialid. **1**: 702, 1926	13	Pain in abdomen of 10 days' duration	Urinary retention	.....	.....	.....	Imperforate hymen; fluctuant swelling	Hymen incised; 300 cc. chocolate-colored fluid; catheterization (700 cc.)
7	LaSalla: Semana méd. **1**: 1264, 1926	14	Pain in hypogastrium	Urinary retention for 11 hours	.....	Swelling in hypogastric region, extending to umbilicus	Mass in vagina	Imperforate hymen, swelling at vulva	Crucial incision of hymen, with cautery; 500 cc. of blood escaped; catheterization (1,200 cc.)
8	Hammond [11]	14	Cramplike pains in lower part of abdomen and pelvis for 10 days	Urinary retention for 24 hours	"Bulging at privates"	Pyriform enlargement from symphysis to umbilicus	Vagina distended; contents under great tension	Imperforate hymen, with marked bulging	Hymen thick; incised; 900 cc. of dark red blood escaped
9	Wilse: Ztschr. f. Sexualwissensch. **13**: 340 (Jan.) 1927	13	Severe abdominal pain for 1 year occurring monthly	Difficulty in urination for 1 year	No menses	Large tender swelling extending from symphysis to 1 fingerbreadth above the navel, with firm, sausage-shaped cord, 3 by 8 cm.	.....	Imperforate hymen; soft swelling outside of vagina	Hymen incised; 1½ liters of greenish-black blood escaped

10	Areta [7]	15	Enlargement of abdomen of few months' duration	.....	From 2 to 3 menstrual periods since age of 13	Midline abdominal tumor arising from pelvis, reaching almost to costal border	.....	No vaginal opening; tense hymeneal membrane crossed by blood vessels	Hymen incised; 3-4 liters of chocolate-colored fluid escaped
11	Areta [7]	14	Severe periodic pains in lower part of abdomen lasting 4-5 days for 6 months	.....	No menses	Abdominal tumor, firm, movable; 3 cm. above symphysis pubis	.....	No vaginal orifice; hymeneal membrane covered with blood vessels	Hymen incised; 300 Gm. of chocolate-colored fluid escaped
12	Areta [7]	17	Intense pain in lower part of abdomen occurring periodically	....	No menses	.....	Mass felt in vagina	Hymeneal membrane crossed by blood vessels in midline	Hymen incised; abundant chocolate-colored fluid escaped
13	Correa: Arch. de Escola med. cir. de Nova Goa; cited by Harrower: Malayan M. J. **5**: 7 (March) 1930	14	Pain in hypogastrium	Difficulty in micturition	.....	.....	.....	Imperforate hymen	Hymen incised; 1½ liters of bluish-black blood escaped
14	Mellwy: Proc. Roy. Soc. Med. **23**: 13 (May) 1930	20	Abdomen increasing in size for 6 months; attacks of pain every month	Frequent micturition of 3 weeks' duration	.....	Abdominal tumor 2 cm. above umbilicus	.....	Hymen imperforate; purplish swelling in vaginal aperture	Circular excision of hymen; old blood escaped
15	Mellwy (sister of patient described in case 14)	16	Pain in back and abdomen at monthly intervals	.....	Vomiting with last attack of pain	Swelling within 1 inch of umbilicus	.....	Hymen imperforate with tense bluish projection between labia	Circular excision of hymen; chocolate-colored fluid flowed for 5 days
16	Mellwy (another sister of patient described in case 14)	14	None	.....	No menses	Swelling in lower part of abdomen (examination under anesthesia)	.....	Imperforate hymen; no bulging	Circular excision 2 pt. (945 cc.) of chocolate-colored fluid escaped
17	Katarey: Indian M. Gaz. **66**: 23 (Jan.) 1931	16	Severe pain and swelling in lower part of abdomen for 20 days	Retention of urine for 48 hours, preceded by dysuria	Malaise; difficulty in defecation; no menses	Hard, rounded tumor in suprapubic region, 3 fingerbreadths above symphysis pubis	Cystic swelling in vagina	Tough cystic tumor between labia majora	Hymen incised; 1½ pt. (710 cc.) menstrual blood escaped
18	Snodgrass [8]	14	Ache in lower part of back; abdominal cramps for 1 week; similar attack 4 months previously; firm, tender mass in lower quadrant of abdomen on left side	Urinary retention; dysuria	Vertigo for 5 days; no menses	Enormously distended bladder extending up to umbilicus	.....	Fluctuant mass, size of a lemon	

TABLE 4.—*Data on Cases of Hematocolpos Due to Imperforate Hymen Reported Since 1917—Continued*

Case	Author	Age	Complaints			Physical Findings			Treatment
			Abdominal	Urinary	Miscellaneous	Abdominal	Rectal	Vulval	
19	DeCherf: Bull. Soc. d'obst. et gynée. **21**: 148 (March) 1932	16	Pain in lower part of abdomen periodically each month for 2 years	.....	No menses; vomiting	.....	.....	Imperforate hymen	Hymen incised, 1 liter brownish blood escaped; 5 days later patient had bilateral pyosalpinx
20	Lazarus [9]	12	.....	Recurrent attacks of urinary retention for 36 hours	No menses	Distended bladder reaching midway to umbilicus	Doughy, fluctuating mass filling vagina and culdesac of Douglas	Bulging mass between labia; imperforate hymen	Hymen incised; 1 liter of old blood escaped
21	Lazarus [9]	12	.....	Recurrent attacks of urinary retention for 36 hours	No menses	Distended bladder	Doughy mass filling vagina and culdesac of Douglas	Imperforate hymen; bulging mass between labia	Hymen incised; 1,000 cc. of old blood escaped
22	Mouradian [10]	14	Excruciating sharp pains in lower part of abdomen for 5 days	Urinary retention for 5 days; catheterization every 6-8 hours	No menses	Suprapubic tumor, almost to umbilicus; fluctuant and very tender	Fluctuant mass in vagina, filling whole pelvic cavity	Hymeneal opening absent; slight bulging at vaginal outlet	Hymen incised; 1,600 cc. of dark, old blood escaped
23	Allain-Conti: Rev. gén. de clin. et de thérap. **46**: 343 (May) 1932	14	Pains in lower part of abdomen for 1½ months	Frequency of urination	Malaise, nausea, vomiting and fever for 10 days	Tender suprapubic swelling	.....	Imperforate hymen; small tender mass between labia majora	Hymen incised; material had fetid odor with traces of pus
24	Aita: Clin. ostet. **35**: 95 (Feb.) 1933	14	Pain in lower part of abdomen	.....	No menses	.....	Large mass, size of a lemon; elastic consistency	Imperforate hymen	Hymen incised; blood of fetid odor escaped
25	Villaca [6]	13	Abdominal pain around umbilicus and flanks for 3 days; soft mass below umbilicus	.....	Abscess around vulva at the age of 5; incised; has not menstruated	Prominence of lower part of abdomen; soft circumscribed tumor around umbilicus	.....	Swelling about perineum; globular swelling between labia	Hymen incised; large quantity of chocolate-colored fluid escaped
26	Caouette and Garant: Bull. Soc. méd. d hôp. Universitaires de Québec **5**: 7 (Jan.) 1934	18	Attacks of pain in lower part of abdomen lasting 24-48 hours during past 5 years	Occasional nocturia	No menses	.....	.....	Imperforate hymen; mass noted	Hymen incised; 2 liters of chocolate-colored fluid escaped

abdomen, and in severity shows all gradations from a vague feeling of weight or dragging to excruciatingly sharp pain. It may be a constant dull ache, or it may be colicky and cramplike. Pain of the latter type is especially common and may occur characteristically at monthly intervals. Accompanying this there may be the molimina of menstruation, although not so frequently as one might expect. Pain in the lower portion of the back may also be present. A few patients revealed that the pain in the abdomen became aggravated when they assumed a sitting position. The duration of the abdominal symptoms in the cases reviewed varied from one week to nine months, the average being about from two to three months.

In addition to the subjective symptoms referred to the abdomen, the patient's attention may be drawn to the presence of a mass in the abdomen. This was noted in fifteen (38 per cent) of the cases reviewed by us. The mass may vary in size from that of a small orange to that of a huge tumor filling the abdomen. It arises from the pelvis and may be located in either quadrant. Its consistency is similar to that of any fluid-containing tumor, firm, cystic or fluctuant; often there may be tenderness or rigidity over the swelling. In several of the cases great distention of the urinary bladder could be readily diagnosed. In others a smaller pear-shaped or sausage-shaped mass extending out from either side of, or superimposed on, the principal tumor, could be differentiated. It is possible that such a mass represents a fallopian tube distended with retained menstrual blood (hematosalpinx) attached to the larger mass of the uterus similarly involved (hematometra). In case 2 (table 4) rupture of the hematosalpinx was confirmed by a laparotomy. Because of recurring severe pain in the right lower quadrant of the abdomen the condition may be erroneously diagnosed as appendicitis. An ovarian cyst, pregnancy or abnormalities of the urinary tract may likewise be confused with this condition.

In many of the cases reviewed the distended vagina filled with pent-up menstrual blood exerted mechanical compression forward on the urethra and angulated it as well, thus interfering with the passage of urine. Complaints with reference to urination ensued (table 3). Retention of urine was most commonly encountered. It occurred in fifteen (38 per cent) of the cases. In eight (20 per cent) cases there were complaints of dysuria, frequency of urination or nocturia. The duration of the urinary retention varied from twelve hours to a week, necessitating repeated catheterization. The total incidence of cases with urinary complaints was 58 per cent.

The frequency with which acute retention of the urine was noted in each group of cases is of particular interest in view of the statements made by some authors with regard to the number of cases reported in which hematocolpos due to imperforate hymen produced retention.

TABLE 5.—*Data on Additional Cases Reviewed by Authors*

Case	Patient	Age	Complaints			Physical Findings			Treatment
			Abdominal	Urinary	Miscellaneous	Abdominal	Rectal	Vulval	
1a	B. L.	14	Feeling of weight and cramplike pains in abdomen and pelvis for 6 days; mass in lower quadrant on right side for 3 mo.	Retention of urine for 24 hr.	Never menstruated; constipated	Round mass in lower quadrant of abdomen on right side, 8 cm. in diameter, cystic and tender	Large cystic mass in vagina	Imperforate hymen; protruding mass which bulged on straining	Crucial incision of hymen with cautery
2a	N. M.	16	Severe colicky pains in pelvis for 5-6 wk.; abdominal swelling for 2 mo.	.....	No menses	Firm cystic mass in lower part of abdomen, extending from symphysis to 2½ fingerbreadths above umbilicus; pear-shaped tumor mass to left of it	Large cystic swelling in culdesac	Imperforate hymen	Crucial incision of hymen; thick dark blood escaped; xeroform packing
3a	F. H.	18	Small mass in abdomen, painful on sitting down	.....	Swelling in vulva; no menses	Tumor mass size of orange; smooth, firm and movable, in lower quadrant on right side	.....	Imperforate hymen, with bulging size of hen's egg	Longitudinal incision of hymen; complete atresia of vagina
4a	S. M.	14	Pains in lower part of abdomen, more marked on sitting, for 1 wk.	Retention of urine for 12 hr.	.....	.....	Vagina distended and tense	Imperforate hymen	Hymen incised; black syrupy blood escaped; iodoform gauze inserted
5a	A. L.	14	Pain in lower part of abdomen and back for 4-5 mo.	.....	Constipation for 4-5 mo.; no menses	Uterus anvil-shaped and hard, extending up to umbilicus	Soft mass in vagina	Bulging; imperforate hymen	Hymen incised with cautery; large quantities of tarry material escaped
6a	E. S.	12	Pain and tenderness in lower part of abdomen for several days	.....	Slight fever	Tenderness and rigidity in both lower quadrants	.....	Imperforate hymen	Hymen perforated by Paquelin's cautery; considerable blood escaped
7a	E. K.	14	Dull aching pain in lower quadrant on right side; mass in that side for 1 mo.	.....	.....	Tenderness over abdominal mass	Soft but tense mass in vagina	Bluish-pink bulging at vaginal outlet; pressure on abdomen accentuates this bulging	Hymen incised; discharge of mucus and blood

8a	D. W.	13	Cramplike abdominal pains for 2 mo.	Occasional nocturia for 2 mo.	No menses	Tenderness in lower part of abdomen	Vaginal mass bulging into rectum	Imperforate hymen with bluish bulging	Hymen incised; old menstrual blood escaped
9a	I. H. (Negro)	15	Cramplike abdominal pains for 4 mo.	.....	Hymen had been incised on two previous occasions; menstrual molimina present monthly for past 4 mo. with no menstrual flow	.....	Fluctuant mass in vagina	Imperforate hymen with small median scar	Hymen incised; old menstrual blood escaped
10a	J. N.	16	Sharp, stabbing pain in lower part of abdomen for 3 mo.; mass below umbilicus for 3 wk.	Difficulty in starting stream for 3 wk.	No menses	Mass below umbilicus size of lemon, with another soft mass superimposed	Mass in posterior fornix	Imperforate hymen	Hymen incised; 2,000 cc. of brownish fluid
11a	C. H.	12	Pain in lower portion of back for 1 wk.	Retention of urine for 3 days	No menses	Distended bladder	Uterus enlarged, distended and cystic; tender mass in vagina	Imperforate hymen; bulging	Hymen incised; 340 cc. of blood escaped
12a	L. K.	14	Dull pain in lower part of abdomen at irregular intervals; hardness in lower part of abdomen for a few mo.	Frequency of urination	No menses	Fluctuant mass size of uterus at 6 months' pregnancy, tender	.....	Bulging; imperforate hymen	Hymen incised; 300 cc. menstrual blood escaped
13a	B. C-B.	12	Cramplike pains in lower part of abdomen and rectum; especially marked on sitting down	.....	Difficulty in defecation for 2 wk.; no menses	Large pear-shaped mass with smaller mass size of hen's egg attached to left of it	.....	No vaginal opening; bulging continuous with abdominal mass	Hymen incised; 1½ pt. (710 cc.) of unclotted dark blood escaped
14a	I. B.	13	Severe cramplike pain in lower part of abdomen for 1 yr.; pain on sitting down	.....	No menses	Mass extending up to umbilicus	Mass size of grapefruit in region of vagina	Imperforate hymen; fluctuant bluish bulging	Hymen incised; 700 cc. blood escaped, culture negative

Snodgrass [8] in 1931 stated that in a search of the literature he was unable to find mention of a single case in which acute retention of urine resulted from hematocolpos with imperforate hymen, although our review of the cases reported in the literature since 1917 revealed twelve cases of acute urinary retention caused by hematocolpos, of which three were reported subsequent to 1931. This collection does not include the cases we are reporting. Lazarus,[9] in March 1932, while reporting two cases of hematocolpometra in which retention of urine was prominent, likewise stated that the latter was a rare symptom in this condition. Mouradian,[10] in April 1932, wrote: "Urinary retention in the young female due to hematocolpometra is said to be very uncommon, in fact, rare. In searching through the literature I have been able to find only one case, which was reported in the *Journal of the American Medical Association*, September 12, 1931." The reference was to Snodgrass'[8] article. Mouradian [10] concluded his report by stating that his was the second case of hematocolpometra with urinary retention reported in the literature to that date. Hammond,[11] in reporting a case of hematocolpos due to imperforate hymen with retention of urine, stated that he had not seen in the literature any reference to urinary retention in cases of imperforate hymen. Thus the statistics regarding this clinical condition need revision.

As stated previously, urinary retention may be the only symptom on account of which the patient presents herself to the physician in cases of imperforate hymen with hematocolpos. Although in the majority of cases a vulvar examination will reveal the condition, yet catheterization has been resorted to frequently, and even cystoscopic examination, as in a case reported by Lazarus [9] (case 20, table 4) in which cystoscopic examination was made several times and the urethra dilated with sounds because of the possibility of a congenital malformation of the urethra. The correct diagnosis was not made until later, after retention of the urine requiring catheterization had occurred twice and a rectal examination had finally been made. This revealed a large fluctuant doughy mass in the vagina and Douglas' culdesac. A careful inspection of the introitus showed an imperforate hymen.

Inspection of the external genitalia and rectal examination of any adolescent girl with similar complaints should enable one to make an early diagnosis. With an early diagnosis the necessity for repeated catheterization will be obviated. In the majority of cases the diagnosis

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8. Snodgrass, M. R.: Acute Urinary Retention in Female: Report of a Case Due to Hematocolpometra, J. A. M. A. **97**:777 (Sept. 12) 1931.

9. Lazarus, Joseph A.: New York State J. Med. **32**:339 (March 15) 1932.

10. Mouradian, A. H.: M. J. & Rec. **135**:369 (April 20) 1932.

11. Hammond, F. C.: Atlantic M. J. **29**:690 (July) 1926.

becomes immediately obvious on even superficial examination of the external genitalia because of a mass protruding between the labia majora. The mass may reach the size of a small orange (figs. 1 and 2). It is globular, tense and bluish or purplish and is continuous with the mass in the abdomen. In other cases, there may be only slight bulging of the imperforate hymen. A soft but tense cystic mass is usually palpated in the region of the vagina, bulging into the rectum. This mass may be so enormous as almost to fill the entire pelvis. The pressure of the mass on the large bowel and rectum may be sufficient to produce constipation, as noted in a few cases. The protocols of four typical cases selected from our group are as follows:

REPORT OF CASES

CASE 11a.—C. H., aged 12, on admission to the hospital complained of pain in the back for one week and retention of urine for three days. The pain was felt in the lower portion of the back, especially on the left side, and was intermittent. The patient was unable to pass urine spontaneously for three days, which necessitated catheterization by a physician on three occasions. Menstruation had not yet begun. Physical examination revealed that the bladder was distended. On rectal examination the cervix and body of the uterus, which were slightly tender, were felt to be enlarged, distended and cystic, and a mass was palpated in the region of the vagina. Vaginal inspection showed an imperforate hymen which seemed to bulge. The hymen was incised and 340 cc. of blood obtained. After this the patient was able to void urine spontaneously.

CASE 12a.[12]—L. K., aged 14, complained of pain in the lower part of the abdomen of six months' duration. It was intermittent, located above the symphysis and dull and aching. The pain occurred in paroxysms at irregular intervals. In addition, the patient stated that she had felt a hardness in the lower part of the abdomen in the last few months. Frequency of urination was also present. There had been no menses. Abdominal examination showed a fluctuant mass the size of the uterus after six months' pregnancy. The entire abdomen was tense. Tenderness was noted over the tumor and in both lower quadrants of the abdomen. Inspection of the external genitalia revealed an imperforate hymen which bulged outward. A fluid wave could be elicited over it by pressure on the abdomen. Thirty cubic centimeters of a dilute solution of formaldehyde was injected through the bulging membrane. The hymen was incised, allowing the escape of about 300 cc. of menstrual blood. The vagina was packed with iodoform gauze.

CASE 13a.[13]—B. C., a Negro girl aged 12, complained that she had experienced difficulty in obtaining movements of her bowels for two weeks and had had cramp-like pains in the rectum and the lower part of the abdomen, especially marked on sitting down on any flat surface, for two weeks. Physical examination revealed a distended abdomen in which there was a large pear-shaped mass extending from the pubis almost to the umbilicus. There was practically no pain or tenderness. A smaller mass the size of a hen's egg was attached to the main tumor, extending to the left. Examination of the external genitalia revealed no vaginal opening.

12. Permission to report this case was obtained from Dr. F. H. Falls of the University of Illinois Research and Educational Hospital.

13. Permission to report this case was obtained from Dr. Joseph Brennemann of the Children's Memorial Hospital.

Instead, there was a bulging in this region which appeared to be continuous with the mass in the abdomen (fig. 1). Menses had not started. The bulging area was incised and 1½ pints (about 710 cc.) of dark red unclotted blood escaped.

CASE 14a.[14]—I. B., aged 13, had had several attacks of severe cramplike pains in the lower part of the abdomen during the past year, the last attack occurring one

Fig. 1 (case 13a).—Bulging of an imperforate hymen which has produced hematocolpos (courtesy of Dr. J. Brennemann of the Children's Memorial Hospital).

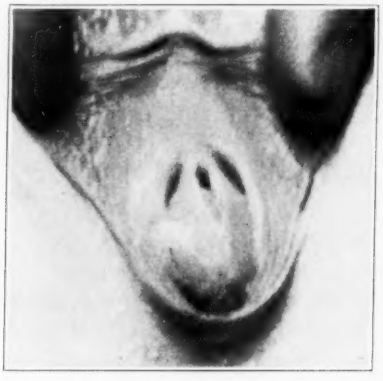

Fig. 2 (case 14a).—Imperforate hymen and fluctuant bulging at the vulva associated with hematocolpos (courtesy of Dr. M. L. Leventhal of the Michael Reese Hospital).

month before admission to the hospital. Considerable pain was noted on sitting down. Menses had not yet begun. Examination revealed an imperforate hymen, and a fluctuant bluish bulge at the vulva (fig. 2). Rectally a mass the size of a

14. Permission to report this case was obtained from Dr. M. L. Leventhal of the Michael Reese Hospital.

grapefruit was felt, and above this there was a smaller mass which extended to the umbillicus. The hymen was incised, and 700 cc. of blood was evacuated. Culture of this fluid showed no growth.

TREATMENT

In the treatment, which is not so simple as may superficially appear, it is essential, the gynecologists state, to open the hymen wide, either by a crucial incision or by a careful wide excision. In one case (case 9a, table 5) a physician made a small linear incision in the imperforate hymen on two occasions for relief of symptoms. On admission to the hospital the patient did not have an opening in the hymeneal membrane, but a small median scar could be discerned in it. Gynecologists further stress the importance of maintaining asepsis scrupulously because of probable involvement of the uterus or tubes. The risk of infection is great since decomposing blood along a dilated tract leading to the peritoneal cavity serves as an excellent medium for the growth of pathogenic organisms. Therefore, peritonitis must be considered as a complication which may follow this operation. In one case (case 19, table 4) incision of the hymen was followed five days later by the development of bilateral pyosalpinx. The postoperative condition in the cases on which we have accumulated data was uneventful, and the stay in the hospital averaged about six days. The fluid that escaped following hymenotomy was for the most part thick and tarry or chocolate-colored and varied in amounts from a few hundred cubic centimeters to several liters. Cultures of the fluid taken in several cases were sterile. Some gynecologists advise washing out the cavity with physiologic solution of sodium chloride or an antispectic solution and then packing it with sterile or iodoform gauze, while others advocate merely postural drainage.

The treatment certainly should be in the hands of the gynecologist.

SUMMARY

Although the pediatrician attends the adolescent child, he is not nearly so familiar with this clinical entity (imperforate hymen) as is the gynecologist. The presence of this anatomic abnormality at the onset of menstruation results in the production of a characteristic group of symptoms and signs due to the retention and accumulation of menstrual blood. Hematocolpos is thus produced, which may be associated with hematometra, hematosalpinx and like conditions. Imperforate hymen merits consideration in differential diagnosis whenever one is confronted with abdominal or urinary complaints in the adolescent female. An abdominal tumor, sometimes reaching upward to the umbilicus, is often seen and palpated in the suprapubic region. Pain in the lower part of the abdomen is frequently complained of. In a certain proportion

of the cases, dysuria and urinary retention resulting from the mechanical pressure of the hematocolpos on the urethra are the most prominent presenting symptoms. Rectal examination reveals a fluctuant mass in the pelvis occupying the position of the vagina and uterus. The diagnosis is established by vaginal inspection, which reveals the absence of a vaginal opening, the hymen being ballooned out by the retained menstrual blood and appearing as a tense bluish or purplish swelling, at times somewhat resembling a presenting fetal head. Although the diagnosis may fall to the periatrician, the therapy is distinctly gynecological, and gynecologists state that it is essential that the hymen be opened widely under scrupulous asepsis, as decomposing blood along a dilated tract leading to the peritoneal cavity serves as an excellent culture medium for the growth of pathogenic organisms.

Forty cases of this syndrome are reviewed.

DISCUSSION

Dr. Joseph Brennemann: It is, of course, evident from the presentation why the pediatrician sees few of these cases and why few of them occur under the fourteenth or fifteenth year. The only case that I have observed and the only one I have known of at the Children's Memorial Hospital was the one included in this report. I was told one day that a patient with an interesting abdominal tumor was to be seen in the outpatient department. I examined the patient externally and ordered that she be sent into the hospital for examination. The next morning the resident physician said that he knew what was the matter with the child. I asked him to give me another chance. I made an examination and found a bulging place where the opening into the vagina should be, and then I, too, knew what was the matter. The patient was a Negro girl, about 12 years old, and she presented a symptom of diagnostic significance. She said, "I can sit on one side or on the other side, but I can't sit on the middle." She could sit comfortably on the toilet. It was easy to see why from an examination. This condition is doubtless congenital.

There is another condition that I think might be of interest in this connection. One sees it in younger girls. It is not congenital. I refer to complete closure of the vaginal opening, not, however, with a thick membrane, as in these cases. The two sides are glued together. If one makes lateral pressure in both directions one finds a bluish raphe running anteroposteriorly, and if one presses harder the membrane comes apart. I think that the adhesions are analogous to those under the prepuce in the male. I have never seen one after the fifth or sixth year.

Dr. Arthur H. Parmelee: It has never been clear to me when the hymen ruptures normally. Some years ago I showed at a clinical meeting at the Cook County Hospital an infant with a hymenal cyst. My associates and I often see new-born infants with these cysts. There is a grayish tumor at the introitus about the size of a cherry, or a little smaller. We have incised these, and viscid mucous material exuded. In practically all new-born girls, if one makes an examination one finds a definite hymenal tag projecting out of the vulva; it is grayish pink and looks as though it were the wall of a cyst that had recently ruptured; one also finds the viscid material exuding from the vulva. Does the rupture of the hymen occur shortly before birth in some of these infants and in some instances persist and form a bulging mass which retains the secretion, and is there in some of the cases a completely occluded hymen which does not present itself in such a way as to be noticeable and which is opened by the physician during the neonatal period? I do not know of any published statement concerning the time when the vaginal tract usually becomes patent.

PRIMARY TUBERCULOSIS OF THE SKIN

REPORT OF TWO CASES

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The incidence of primary tuberculosis of the skin relative to that of other forms of primary tuberculosis has been estimated from postmortem studies. Of 2,114 cases of tuberculosis reported by various investigators in which the site of the primary involvement was determined, Ghon and Kudlich [1] found three (0.14 per cent) to be instances of primary tuberculosis of the skin.

Relatively few cases of undoubted primary tuberculosis of the skin have been reported, exclusive of tuberculosis following circumcision and primary tuberculosis of the skin produced by BCG. Krantz [2] in 1931 collected reports of thirty-four cases of primary tuberculosis of the skin from the literature. Histologic or bacteriologic proof of tuberculosis of the skin was reported in fifteen of the cases and postmortem evidence in four, while in the remaining fifteen only clinical data were mentioned. In addition, Krantz [2] listed eight other cases which in his opinion were probably instances of primary involvement of the skin although they had not originally been reported as such. He also cited several cases in which the tuberculous infection of the skin was attributed to the injection of serum for measles,[3] and others in which vaccines of attenuated tubercle bacilli had been injected.[4] Since 1931, so far as we can determine, eleven additional cases of primary tuberculosis of the skin, with histologic proof, have been reported.[5] In addition, reports of fifty-eight

From the Pediatric Service of the Vanderbilt Clinic.

1. Ghon, A., and Kudlich, H., in Engel, S., and Pirquet, C.: Handbuch der Kindertuberkulose, Leipzig, Georg Thieme, 1930.

2. Krantz, W.: Zentralbl. f. Haut- u. Geschlechtskr. **39**:1, 1931.

3. Kundratitz, K.: Wien. med. Wchnschr. **74**:1027, 1924.

4. Louste, A., and Lévy-Franckel, A.: Bull. Soc. franç. de dermat. et syph. **37**:366 (March) 1930. Milian, M.: ibid. **37**:366, 1930.

5. (*a*) Beszecny, R.: Dermat. Wchnschr. **96**:58, 1933. (*b*) Siegl, J.: Beitr. z. Klin. d. Tuberk. **83**:581, 1933. (*c*) Wahlgren, F.: Acta chir. Scandinav. **72**: 537, 1932. (*d*) Bernard, L.; Lelong, M.; Lamy, M., and Gauthier-Villars, P.: Ann. de méd. **30**:401 (Dec.) 1931. (*e*) Bruusgaard, E.: Arch. f. Dermat. u. Syph. **152**:465, 1926; Brit. J. Dermat. **46**:113, 1934.

cases of tuberculosis following circumcision were collected from the literature by Wolff [6] in 1921.

Two cases which were probably instances of primary tuberculosis of the skin were found in the Vanderbilt Clinic during 1933.

REPORT OF CASES

CASE 1.—*History.*—J. R. was delivered at term by cesarean section and weighed 7 pounds (3,175 Gm.) at birth. He did not do well for the first four days, but thereafter his development was normal. For the first three months, he was breast fed. After that he was fed on a cow's milk formula and was given orange juice and cod liver oil. He was circumcised at 2 years and vaccinated at 5 years of age. He had none of the contagious diseases of childhood.

There were no other children in the family. For the first two years of his life the child lived in the same household with one of his aunts, who later died of tuberculosis. In addition, he was in contact with another aunt and a cousin with tuberculosis. There were no other members of the family who had any disease. When the child was 2 years of age his grandmother, who took care of him all the time, noticed a cutaneous lesion which resembled a blister on the outer aspect of the left leg, somewhat below the knee. She said that the blister ruptured, leaving a raw area, which was repeatedly scratched and traumatized by the child so that healing was delayed until he became 5 years of age. At that time members of the family noticed a lump in his left inguinal region, which soon became soft and red. When this occurred he was brought to the clinic.

Physical Examination.—The patient was a well nourished and well developed Negro boy, healthy-looking and afebrile. In the left inguinal region there was a fluctuant mass 3 cm. in diameter, which was thought to be a lymph node. On the outer aspect of the left leg, about 7 cm. below the knee, there was a scar 2.5 cm. in diameter, with a whitish atrophic center. Its edges were raised and dotted with pinpoint-sized to pinhead-sized papules covered by brownish-red scales. No abnormally enlarged lymph nodes were palpable in the right inguinal region or in the axillary and cervical regions. The heart and lungs were normal. There were no palpable masses in the abdomen. The ears, nose and throat were normal.

Laboratory Findings.—The Mantoux reaction to 0.1 mg. of old tuberculin was markedly positive (diameter of induration 25 mm., diameter of redness 65 mm.). The results of the examination of the urine, the Kahn test and the blood count were normal. Pus from the left femoral lymph node showed no growth on culture. Smears of material obtained from three concentrated stomach lavages were negative for tubercle bacilli. The erythrocyte sedimentation rate was 18 mm. in one-half hour and 40 mm. in one hour.

The roentgenograms were interpreted by Dr. John Caffey as follows: "The left inguinal region shows several clusters of small shadows of calcium density, which are consistent with calcifying tuberculosis of the left inguinal lymph glands. The roentgenograms show that the chest, abdomen, neck and axillary regions are normal."

Treatment.—At first an incision of the cold abscess in the left inguinal region was made, and the pus was examined. Later the lymph nodes in the region were excised. The scar on the left subpopliteal region was also excised.

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6. Wolff, E.: Klin. Wchnschr. **58**:1531, 1921.

Present Status.—Both operative wounds healed by primary union. There is no clinical evidence of tuberculosis at present, four and one-fourth years after the onset of the cutaneous lesion.

Histopathologic Report (made by Dr. Martha Wollstein).—Cutaneous Lesion: "On section through the specimen, a small translucent yellow nodule 2 mm. wide was found immediately beneath the epidermis. A section taken from the margin of the lesion contained large, localized collections of epithelioid cells and lymphocytes in the corium, lying adjacent to hair follicles. In one such cellular collection there was a focus of necrosis surrounded by radially arranged elongated cells. The epidermis was thin over one of the lesions but had not ulcerated. In the remainder of the corium there were many small round cells about the vessels."

Femoral Glands: "A section from the lymph glands showed one small node in which the normal architecture was in part preserved. Scattered through the gland, however, were collections of epithelioid and lymphoid cells. One of the tubercles had undergone central necrosis and beginning calcification."

"In a larger node the main part was replaced by heavy deposits of calcium and necrotic tissue. Tubercles occurred also; there were areas of infiltration by polymorphonuclear cells, and the capsule and surrounding areolar tissue were thickened by collagenous connective tissue."

Skin and Sinus in Inguinal Region: "Many miliary tubercles and larger collections of epithelioid and small round cells with giant cells among them were present both in the corium and in the subcutaneous fat, with an increase in connective tissue in the subcutaneous adipose tissue. About the small vessels of the corium there was an increase in the number of small round cells with small deposits of brownish pigment among them."

Pathologic Diagnosis: The diagnosis was "tuberculosis of the skin of the leg and tuberculosis of the inguinal lymph glands with tuberculous sinus."

Comment.—It is probable that the child had impetigo of the left leg at the age of 2 years, the lesion of which subsequently became exogenously infected with tubercle bacilli. A chronic, indolent ulcer formed, which finally healed, leaving a tuberculous scar. The regional lymph glands became tuberculous. The tuberculous process in some of the glands receded with calcific deposit. A part of the glandular tuberculosis became liquefied and formed a cold abscess. Since the Mantoux reaction was positive when the child was first seen, one cannot absolutely rule out the possibility of a previous tuberculous infection which had left no signs. However, since there was no clinical evidence of tuberculosis elsewhere in the body, the old tuberculous lesion of the skin with the partly calcified and partly liquefied tuberculous regional glands may reasonably be regarded as the primary complex.

CASE 2.—*History.*—L. O. H., a girl, weighed 8½ pounds (3,855 Gm.) at her birth. The delivery was normal. She was breast fed for six months. Cod liver oil and orange juice were given after the child was 2 years old. Her development was normal. Of the contagious diseases, she had measles, chickenpox, mumps and whooping cough.

The father died of heart disease. The mother was living and well. She had one miscarriage and eight living children. All the children were normal. Four

of them were older than the patient. All of these gave positive reactions to 0.1 mg. of old tuberculin given intracutaneously, but the three younger children gave negative reactions to 0.1 mg. of old tuberculin.

In July 1933, the child went swimming at a public beach, where she stepped on a piece of glass and cut the sole of her foot between the first and the second toe. The wound failed to heal. This was attributed to the presence of gritty foreign particles, which were removed surgically in November, four months after the injury. Two months later, six months after the injury, the wound had healed completely. About four weeks after the injury a hard mass was noticed in the left inguinal region. The mass gradually became larger and showed softening and fluctuation. The skin became red and adherent to the underlying abscess, which was incised in November 1933. The incision wound drained persistently and did not heal until October 1934, i. e., fifteen months after the injury to the toe.

Erythema nodosum developed over the lower extremities in September 1933, two months after the injury to the toe. At that time, the reaction to the intra-

Tuberculous lesion of the skin four years after onset.

cutaneous test with 0.01 mg. of old tuberculin was strongly positive (diameter of induration 20 mm., of erythema 40 mm.). A roentgenogram showed the chest to be normal. The electrocardiogram and a roentgenogram of the heart taken at a distance of 6 feet (1.8 meters) also showed a normal condition. The cutaneous reaction to streptococcus nucleoprotein was positive. The erythrocyte sedimentation rate was 98 mm. in thirty minutes and 122 mm. in one hour.

Physical Examination.—The patient appeared well developed but poorly nourished. She came to the clinic on account of the mass in the left inguinal region. A granulating, almost healed wound was visible at the site of the injury, which had occurred six months before, between the first and the second toe on the left foot. The femoral lymph nodes on the same side were enlarged and fluctuating. The overlying skin was bluish red. The wound left by the incision, made two months previously, was still discharging thick, yellow pus. The results of the physical examination were otherwise negative.

Laboratory Findings.—The intracutaneous tuberculin test was repeated with 0.01 mg. of old tuberculin, and the reaction was found to be strongly positive. A smear of pus from the inguinal abscess failed to reveal tubercle bacilli. Repeated

examination of the sputum showed no acid-fast organisms. The results of the Kahn test, examination of the urine and blood counts were normal.

The roentgenograms were interpreted by Dr. John Caffey as follows: "There is no evidence of tuberculosis, enlarged glands or calcific deposits in the lungs, abdomen and inguinal regions. The bones of the left foot appear normal."

Present Status.—There is no clinical evidence of tuberculosis at present, twenty-two months after the onset of the cutaneous lesion. There are healed scars at the site of the cutaneous lesion and at the site of the sinus in the inguinal region.

Histopathologic Report (made by Dr. B. Dodd).—"The biopsy specimen, from the glands of the left femur, was a ragged piece of firm, grayish-brown tissue 3.5 by 1.5 by 1.5 cm. Sectioning showed a homogeneous surface, with an occasional small, round, faint, whitish area. Sections showed the lymphoid tissue to be riddled with many tubercles of varying sizes, composed of pale-staining, concentrically arranged epithelioid cells. A few areas of caseous necrosis were seen, especially at the margins of the section. Some of the tubercles showed central necrosis."

The pathologic diagnosis was "tuberculosis of the femoral lymph glands."

Comment.—The development of tuberculosis at the site of an open wound and the formation in several weeks of a regional tuberculous lymphadenitis that progressed to the formation of an abscess in a child with no evidence of tuberculosis elsewhere in the body justify the diagnosis of primary tuberculosis of the skin. The occurrence of erythema nodosum two months after the injury when the infection probably occurred is noteworthy. The relationship of erythema nodosum to the primary tuberculous lesion has been seen so often that the occurrence of erythema nodosum makes one suspect the presence of an active, relatively recent primary lesion. Erythema nodosum may also appear when there is a reactivation of an old tuberculous lesion.[7]

COMMENT

Absolute identification of primary tuberculosis of the skin demands not only histologic and bacteriologic proof of the tuberculous nature of the lesion but also evidence that it is the primary infection. The tuberculous nature of the cutaneous lesion can be verified with the aid of biopsy, smear or culture. The fact that the lesion is primary is difficult to prove.

The pathologic evidence of a primary lesion, according to Ghon and Kudlich,[1] is the presence of earliest tuberculous involvement in the local lesion and its regional lymph glands. Clinically, it is difficult to apply this criterion to a study of primary tuberculosis of the skin.

The greatest difficulty attends the exclusion of a previous tuberculous infection. If a repeatedly negative reaction to tuberculin becomes

7. Orosz, D.: Beitr. z. Klin. d. Tuberk. **79**:163 and 173, 1932.

positive while the cutaneous lesion is developing, this constitutes fairly good evidence of a primary infection. However, it does not entirely exclude the possibility of the patient's being in the preallergic period of a previous infection or that of his being in an anergic phase associated with a much older infection. In the majority of the published cases the reaction to tuberculin was positive, though in most instances the test was not made until many weeks after the onset of the cutaneous infection. The positive reaction, however, might have been the effect either of the tuberculous lesion of the skin or of a previous tuberculous infection which was not detectable clinically. In this connection the age of the child is important; the younger the child, the more remote is the possibility of a previous tuberculous infection.

Another difficulty in the diagnosis is that the primary cutaneous lesion is not pathognomonic. Although it is different from numerous forms of secondary tuberculosis of the skin, such as tuberculosis verrucosa cutis and lupus vulgaris, it may clinically resemble a localized exogenous tuberculosis in a person previously infected with tuberculosis.[8]

An aid in the differential diagnosis of the primary and reinfection types of tuberculosis of the skin is the degree of involvement of the regional lymph glands. In primary tuberculosis the regional glands are almost invariably affected and usually show a progressive process which leads to caseation and often to liquefaction. In tuberculous superinfection, although the regional glands may occasionally become noticeably affected, the glandular involvement is usually less progressive and less marked.

Our experience with the production of primary tuberculosis of the skin in three hundred and thirty-three infants by means of BCG injected parenterally has also shown that the regional glands become noticeably affected. Regional adenopathy was found in 74 per cent of the children whose reaction to the cutaneous test was negative before inoculation. In eighteen cases in which BCG was used in children who gave a positive reaction to tuberculin, glandular enlargement was nearly always absent.

In the experiments with BCG a difference was also noted between the primary and secondary cutaneous lesions in the early stages of their development. The process in the primary lesion developed so slowly that no noteworthy changes were visible until the second week, when a persistent red papule was seen. In tuberculous children, erythema and induration were visible within twenty-four hours and ulceration occurred in from three to four days. The differences in the cutaneous reaction have also been repeatedly seen in experiments with animals.[9]

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8. Stokes, J. H.: Am. J. M. Sc. **169**:722, 1925. Bruusgaard.[5e] Siegl.[5b] Wahlgren.[5c]

9. Krause, A. K., and Peters, D.: Am. Rev. Tuberc. **4**:551 (Oct.) 1920.

From the nature of the development of the primary cutaneous lesion, one can readily understand the early symptoms of the disease. There is usually a traumatic injury through which tubercle bacilli invade the skin. The infection develops so slowly at first that the wound may heal completely during the first week and the injury be forgotten until about the second week, when a persistent red nodule may be seen as the first local sign of tuberculosis. This is usually overlooked until ulceration occurs and the regional glands begin to enlarge.

Primary tuberculosis of the skin has usually been found on exposed parts of the skin that have been subjected to trauma or infection and have come in contact with tubercle bacilli. In some of the cases trauma was slight and was attributed to the scratch of a nail, a twig or a cat's claw [10] or to the accidental prick of a needle. In other instances there were deep lacerations from pieces of glass, crockery or metal. In several other instances the lesion developed in the lobe of the ear at the site of a puncture for ear rings. A relatively frequent site of infection that used to be reported, mostly in Europe, was the circumcision wound.[6] In females, the primary tuberculous lesion has been found in a few instances on the vulva.[11] When there was no history of trauma, tuberculosis occasionally developed at the site of a cutaneous infection, usually eczema [12] or impetigo.[13]

The primary cutaneous lesion when first recognized is usually described as sharply circumscribed, slightly raised and covered with a crust. Under the crust there is a shallow ulcer with purulent discharge. The ulcer has a firm, finely granular base and edges that are slightly undermined and infiltrated. In several instances, minute "lupus" nodules around the ulcer or its healed scar were described.[14] According to Wahlgren,[5c] these nodules appear about six months or more after the onset of the infection. The regional lymph glands are enlarged and are in various stages of caseation and softening, usually with the formation of fistulas.

The sequence of events in the early stages of primary tuberculosis of the skin has been well followed in cases of tuberculosis following circumcision, in which the exact date of onset of the symptoms is known. In some cases [15] an indurated, hard infiltrated area appears on the prepuce or frenulum from one to two weeks after circumcision. In

10. Volk, R., in Jadassohn, J.: Handbuch der Haut-und Geschlechtskrankheiten, Berlin, Julius Springer, 1931, vol. 10, pt. 1, p. 192.

11. (*a*) Hamburger, F.: Die Tuberkulose des Kindesalters, Leipzig, Franz Deuticke, 1912. (*b*) Bruusgaard.[5e]

12. Escherich, T.: Wien. klin. Wchnschr. **22**:515, 1909. Hamburger.[11a]

13. Hallé and Garnier: Bull. Soc. de pédiat. de Paris **28**:191, 1930. Siegl.[5b]

14. Bruusgaard.[5e] Wahlgren.[5c]

15. Reuben, M. H.: Arch. Pediat. **34**:187, 1917.

others [16] symptoms appear about a week after the operation, when it is noticed that the wound has not healed and a persistent ulcer is present on the prepuce or frenulum. At the end of from two to three weeks, the inguinal glands are enlarged, and they may break down in from two to three months.

The outcome in cases of primary tuberculosis of the skin seems to vary with the child's age, among other factors.

In cases of infection following circumcision, which usually occurs at the end of the first week of life, nineteen, or 41 per cent, of forty-six patients died in the first year.[6] The postmortem observations, reported after thirteen of the deaths, showed that seven patients died of miliary tuberculosis, five of nontuberculous sepsis arising from the local infection and one of diphtheria. Most of the infants who were observed for more than one year either acquired chronic tuberculosis or died of tuberculosis during the period of observation.

In cases of primary tuberculosis of the skin in other regions of the body, the course of thirty-eight patients was followed for longer than four months after the onset of symptoms. Thirteen became infected in the first year of life. Of these, eleven (84 per cent) had generalized, disseminated lesions, and two (16 per cent) had only a local primary complex. Of the former, five died of miliary tuberculosis, while the remaining six had tuberculids but survived the period of observation. Of the latter, one patient contracted measles and died and the other had no complications. Two children became infected in the second year of life. One had tuberculids and the other died of tuberculosis. Therefore, of fifteen patients who became infected in the first two years of life thirteen (85 per cent) had generalized, disseminated tuberculous lesions.

In patients from the third to the thirteenth year of life, there were twenty-three cases of infection. In all these it was reported that the tuberculous process was confined to the primary complex, namely, to the cutaneous lesion and the involved regional glands. The local process usually became clinically inactive in from two to three years. In the skin lesion the end-result was a dense scar. In several cases lupus nodules appeared in and around the scar.[17] With the retrogression of the process in the regional lymph nodes, the nodules became smaller and often had calcium deposits, visible in roentgenograms. In cases in which an abscess formed, the contents discharged for months through a sinus, which finally closed with the formation of scar tissue.

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16. Holt, E. L.: Tuberculosis Acquired Through Ritual Circumcision. J. A. M. A. **61**:99 (July 12) 1913.

17. Bruusgaard.[5e] Siegl.[5b] Stokes.[8] Wahlgren.[5c]

SUMMARY

Two cases which were probably instances of primary tuberculosis of the skin are described. In one case, histologic evidence of the tuberculous nature of lesions of the skin and regional glands is presented. In the other case, histologic proof of the tuberculous nature of the involvement of the regional lymph nodes is shown.

The clinical evidence seems to indicate that the lesions were primary. No clinical tuberculosis elsewhere in the body developed within four and a quarter years after the onset of the cutaneous lesion in one case and within one and three-quarters years after the onset in the other case.

1225 Park Avenue.

MIXED TUMOR OF THE MEDIASTINUM OF MESENCHYMAL ORIGIN

REPORT OF A CASE IN A CHILD THREE YEARS OLD

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AND
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The occurrence of a tumor primary in the mediastinum and not originating from normal mediastinal structures is rare, particularly in children.

The instance presented here is remarkable because pathologic study of the neoplasm revealed it to be malignant and composed of tissues derived from the mesoderm alone.

REPORT OF CASE

History.—A boy, 3 years and 3 months old, of Italian-American parentage, was admitted to the pediatric service of the Rhode Island Hospital on Jan. 17, 1935.

The chief complaints were of a cold for one week and of fever and rapid breathing for four days.

The family history was essentially unimportant.

The child was born at full term with an uneventful delivery and was said to be normal. He was fed a formula after the first month and was weaned at the age of 12 months. He had diphtheria at the age of 1 year. The child's mother stated that he had breathed rapidly always.

One week prior to his admission a "cold" developed, with coryza and a cough, and he appeared drowsy. Three days later he was feverish; the cough was worse, and his respiration became more rapid. Tympany over the right lung two days before admission suggested pneumothorax to the attending physician. Pneumonia also was considered likely.

Physical Examination.—Physical examination revealed a fairly well developed but undernourished white boy of approximately 3½ years, who was breathing rapidly. The skin was pale, hot and moist. The temperature was 103.6 F., the pulse rate 144 and the respiratory rate 30.

The chest appeared symmetrical, but the right side failed to move with respiration. There was flatness over the lower two thirds of the right lung posteriorly and in the right axilla, with considerably diminished breath sounds over this area. Bronchial breathing was heard at the base of the left lung. The pulmonary fields were clear anteriorly, but there was hyperresonance at the apex of the right lung. The maximal cardiac impulse was felt from 2 to 3 cm. inside

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From the Department of Pediatrics and the Department of Pathology, Rhode Island Hospital.

the left anterior axillary line. The sounds were rapid but regular and of good quality. No murmurs were noted. On palpation the liver was felt to extend almost to the level of the umbilicus in the midline. The extremities were essentially normal. There was no glandular enlargement.

On the patient's admission the hemoglobin content was 66 per cent (Sahli), and the white cell count was 17,450.

Course in the Hospital.—Fluoroscopic study and initial roentgenograms of the chest showed features suggestive of encapsulated empyema with displacement of the heart and possibly pneumonic consolidation. Thoracentesis on the day after the patient's admission yielded 50 cc. of serosanguineous fluid. No organisms were found in the smear or culture of this material. During the next ten days thoracentesis was attempted repeatedly in different places over the right side of the chest. Progressively smaller amounts of bloody fluid, all of which were sterile, were obtained. Subsequent roentgenograms revealed little change in the right

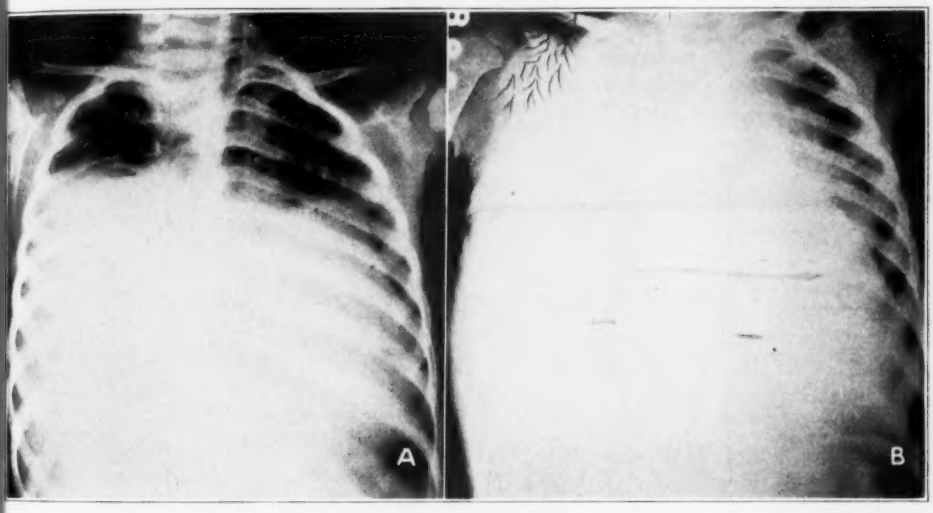

Fig. 1.—*A*, roentgenogram taken on Jan. 17, 1935, showing dulness in the right side of the chest below the second rib, with air above this and a possible fluid level. There is displacement of the cardiac shadow to the left. *B*, roentgenogram taken Feb. 7, 1935, revealing an extension of the tumor mass. The rib defect on the right marks the site of the operation.

half of the chest except for the appearance of several distinct fluid levels and a gradual extension of the opacity to the apex of the right lung. Neither encapsulated empyema nor neoplasm could be excluded definitely.

The temperature ranged between 101 and 102 F. but was not of the septic type. Respiration became more rapid and somewhat labored. There was no cyanosis. Within two weeks the entire right thorax except the apex became flat to percussion, and the breath sounds were barely audible.

On January 29, several hours after a chest tap, the patient had a severe coughing spell, and right hemiplegia developed. The spinal fluid was clear, and the eyegrounds were normal. The right leg became edematous at that time and remained so until death.

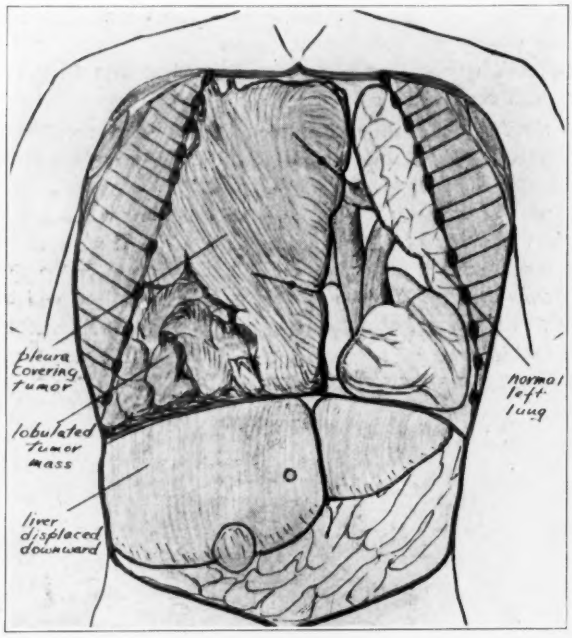

Fig. 2.—Sketch of the tumor and the thoracic viscera in situ.

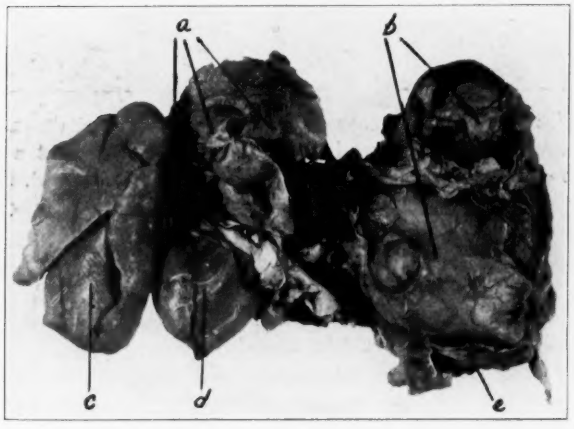

Fig. 3.—Photograph of the thoracic contents (posterior view). The atelectatic lobes of the right lung are indicated by *a*, the tumor mass by *b*, the normal left lung by *c*, the heart by *d* and the parietal pleura by *e*.

On February 2 Dr. Raymond Bugbee performed an exploratory thoracotomy for diagnosis, with the idea of possible surgical treatment. Immediately beneath and separate from the parietal pleura a solid porklike mass was encountered. A small piece of tissue was removed, and the wound was closed. After the operation the temperature was lower, but the child continued to fail.

On February 4 roentgen treatments to the right side of the chest were started, and three were given. At this time, there was dulness to percussion over the entire right side of the thorax, extending somewhat beyond the midline. There

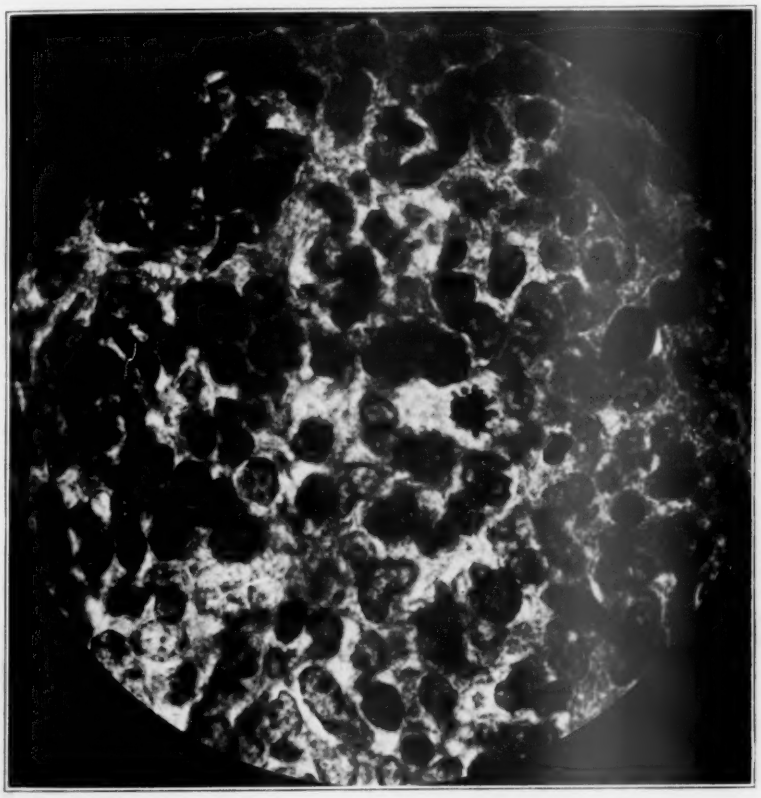

Fig. 4.—Section from the biopsy specimen, showing round cells, closely packed nuclei and one mitotic figure; × 350.

was resonance in the left axilla only. The maximal cardiac impulse was in the midaxilla.

On February 15 numerous petechial hemorrhages appeared over the trunk and arms. A blood culture taken at that time was sterile. The bleeding time was eleven minutes, and the number of blood platelets was diminished. The total leukocyte count was 8,500, with 86 per cent polymorphonuclear leukocytes, 12 per cent lymphocytes and 2 per cent monocytes.

The emaciation, pallor and dyspnea increased, and the child died on February 21, five weeks after admission.

Biopsy.—The biopsy specimen consisted of six pieces of tissue, which measured from 0.3 cm. to 1.5 cm. in diameter. The tissue was soft but not friable. It cut easily, revealing a glistening, pearly-gray, finely granular surface. Microscopic preparations of tissue fixed in Zenker's solution and stained with hematoxylin and eosin showed an extremely cellular, anaplastic tumor structure which contained little stroma and many blood vessels. The cells were round and polygonal and in small areas spindle-shaped. The cytoplasm was scant, and the outline of the cells was poorly defined. The nuclei were closely packed and varied considerably in

Fig. 5.—Section from the tumor at autopsy, showing cartilage and connective tissue of a myxomatous type; × 80.

size, shape and depth of staining. Many were lobulated. Some nuclei contained large vesicular inclusions or a granular, loose reticulum of chromatin situated near their periphery. Others contained large nucleoli. Mitotic figures were abundant. Many of these were multipolar. Tumor cells were present in small structures resembling blood vessels. Here and there were small vacuole-like spaces, which were separated by a cellular and fibrillar reticulum. There were a few small bands of fusiform and stellate cells with a poorly defined cytoplasm, which tended to pass into delicate fibrillar processes. These processes appeared to anastomose from one cell to another. Such areas were suggestive of mesenchymal tissue.

Necropsy.—A complete postmortem examination was done five hours after death.

The body was that of a fairly well developed but emaciated boy, approximately 3½ years of age, and measured 89 cm. in length. There was no generalized or localized glandular enlargement. The trachea was in the midline of the neck. The thyroid gland was of average size. There was a slight but definite generalized fulness of the right side of the chest, with comparable increase in the width of the intercostal spaces on that side. There was an unhealed surgical wound 4 cm. in length in the seventh intercostal space in the right midaxillary line. Slight pitting edema of the lower part of the right leg was present.

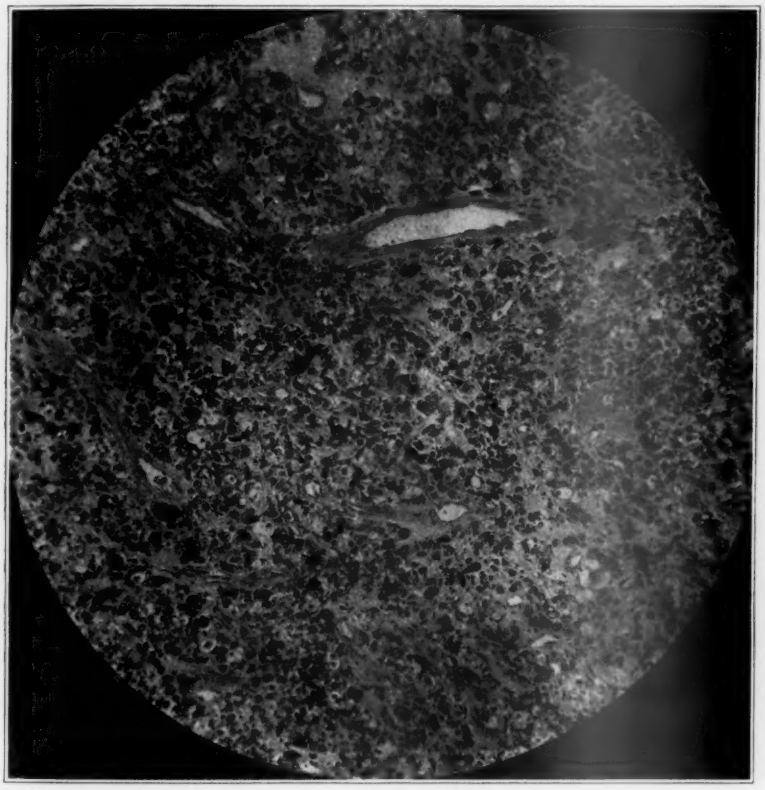

Fig. 6.—Section from the tumor at autopsy, showing blood vessels and intercellular substance; × 80.

In the thoracic cavity the right pleural space, which was a little larger than the left, was filled by a mass which had displaced the heart and mediastinum to the left, so that the apex of the heart extended to the left midaxillary line. The left lung was pressed upward by the displaced mediastinum and occupied only approximately one half of the left pleural space. In situ, the right lung could not be seen. After the tumor mass was lifted forward, all three lobes could be identified, collapsed and compressed posteriorly along the right border of the vertebral column. Neither pleural space contained fluid. The right parietal pleura

was slightly thickened, and the surface of the tumor was adherent to it throughout by delicate fibrous adhesions. Medially, the tumor was adherent to the visceral pleura of the upper lobe of the right lung and to the pericardium near the base of the right ventricle. A nodule of tumor tissue 3 by 2 by 0.5 cm. was present in the pericardium over the anterolateral surface of the right ventricle medial to the attachment of the main tumor mass. Lymph nodes about the hili of the lungs were not enlarged. The thymus and the thyroid were normal in appearance and distinct from the tumor.

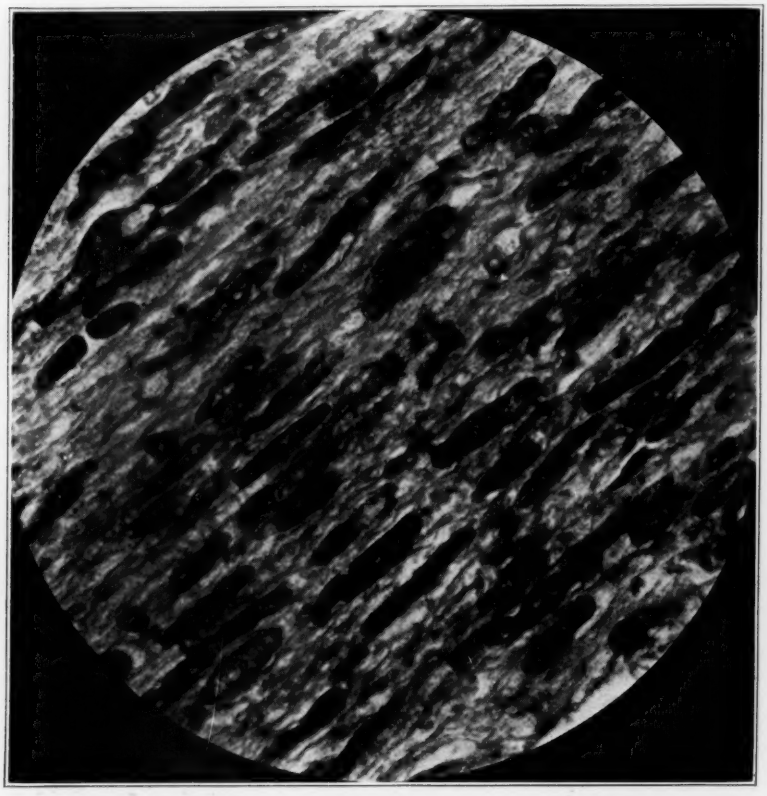

Fig. 7.—Section from the tumor at autopsy, showing spindle-shaped cells; × 350.

The tumor possessed a thin, translucent, grayish-white capsule. It was divided into structures resembling lobes (six), but its surface adjusted itself snugly and smoothly against the inner surface of the chest wall. These lobes varied from 2.5 cm. to 12 cm. in diameter. Some of the larger lobes were bluntly dissected into numerous smaller, irregularly shaped, well circumscribed but not encapsulated portions. For the most part, the tissue was fairly firm, of "meaty" consistency, slightly elastic and gray to pale yellow or pink. Section revealed a mottled pinkish-yellow-gray cut surface, with numerous soft, pale red necrotic areas measuring up to 2.5 cm. in diameter. Several soft pale yellow nodules, of the consistency of fat and averaging 2.5 cm. in diameter, were present along the

diaphragmatic surface of the main mass. A nodule 2.5 cm. in diameter, which was of cartilaginous consistency and was gray and slightly granular, was appended to the large nodule anteriorly just opposite the hilus of the right lung. The tumor in the pericardium has been mentioned.

The peritoneal cavity was not remarkable except for the fact that the edge of the liver extended 6 cm. below the costal margin in the right midclavicular line. The dome of the diaphragm extended to the sixth intercostal space in the right midclavicular line, being forced down by the intrathoracic mass. On the left, it extended to the fifth intercostal space. The mesenteric lymph nodes were not enlarged.

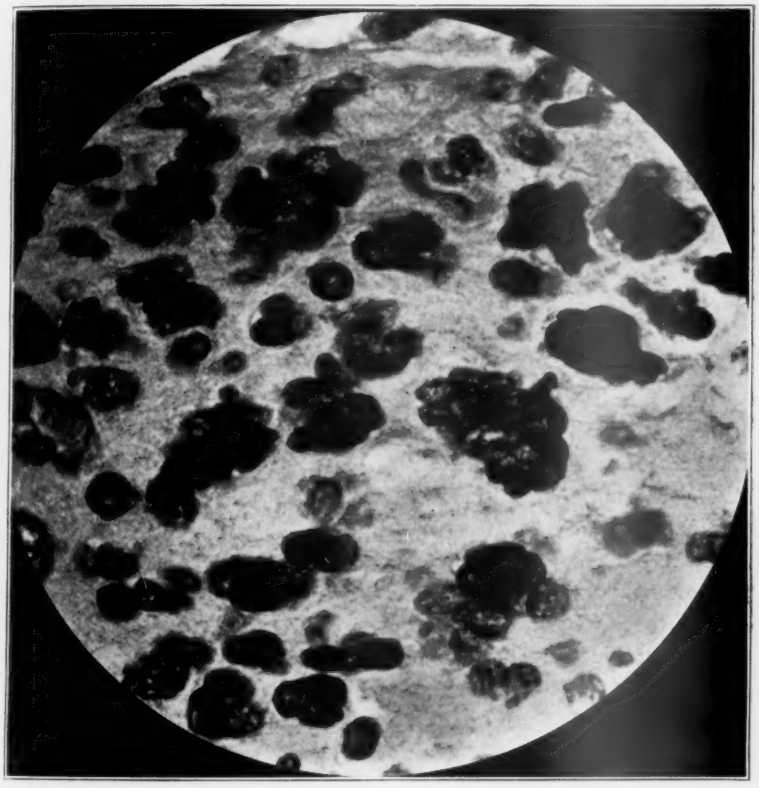

Fig. 8.—Section from the tumor at autopsy, showing multinucleated giant cells; × 350.

In the brain there was a soft, friable, necrotic area with an irregular, central cavity, 1.5 cm. in diameter, involving the left internal capsule and a portion of the left caudate nucleus and lenticular nucleus at the level of a coronal section through the mamillary bodies. Other organs showed no gross abnormality.

Microscopic sections of the tumor removed at autopsy showed a vascular and cellular structure which differed from that of the biopsy specimen in that it presented more differentiation of tissues. The cells varied in size, shape, distinctness of cell outline, quantity of cytoplasm and shape of the nucleus. Many areas

contained abundant multinucleated cells, some cells containing up to fifty nuclei. As a whole the cells were not so closely packed as those in the biopsy specimen, and there was an intervening amorphous basophilic ground substance. In areas where spindle-shaped cells were frequent, there was more abundant ground substance than where round cells were preponderant. These spindle-shaped cells tended to be localized in interlacing basophilic bands resembling connective tissue. In the midst of some of these areas, there were irregular-shaped sheets of cartilage showing varying degrees of deposition of chondromucin. Between the sheets of cartilage, there was a loose fibrillar tissue with stellate and spindle-shaped cells the fibrils of which appeared to anastomose with one another from cell to cell. The tissue possessed a faint basophilic tint and was apparently myxomatous in type. Throughout the sections there were many small, thin-walled blood vessels, about which there was concentration of the tumor cells to a small extent. There were large areas of necrosis with extravasation of erythrocytes. In such places the blood vessels were markedly dilated, and some were thrombosed.

Microscopic study of the collapsed right lung showed the alveoli to be greatly reduced in size. The alveolar walls were slightly thickened by fibrous tissue, and the capillaries within them contained little blood. Their lining epithelium was intact. The thickened walls were infiltrated by a few lymphocytes and large mononuclear cells and occasional polymorphonuclear leukocytes. There was slight peribronchial and perivascular fibrosis.

Histologic study of the brain showed the area of necrosis in the basal ganglia on the left to contain numerous large mononuclear scavenger cells. Between these cells there was a basophilic granular, fibrillar débris. No tumor was present.

Microscopic sections of tissues other than those described disclosed no abnormality.

COMMENT

Despite the relatively great bulk of the tumor in this instance, significant pulmonary symptoms did not arise until a late stage. The mechanism of gradual compression atelectasis of the right lung rather than an early occlusion of a bronchus may explain this. A small patch of pneumonia probably accounted for the signs of acute infection on admission to the hospital. In retrospect the continued febrile course might be explained readily on the basis of absorption from necrotic areas in the tumor.

At first, encapsulated empyema seemed the most likely diagnosis. The serosanguineous fluid obtained on repeated thoracentesis as well as the unusual appearance of the roentgenograms created a strong suspicion of tumor. This was confirmed at operation. The hemiplegia was interpreted as being due to an embolus originating from the tumor area. There was no clinical evidence of metastases elsewhere.

Roentgenograms taken a few days before death and after the radiation therapy indicated some apparent shrinkage of the tumor. This leads one to speculate as to the possible benefit that might have been derived from adequate roentgen treatment given earlier in the course.

From the pathologic viewpoint, a new growth primary in the mediastinum is particularly interesting because it is possible only to speculate

From the pathologic point of view, a new growth primary in the mediastinum is particularly interesting because it is possible only to

speculate with regard to its origin. The tumor here discussed was a solid structure with no evidence of cyst formation grossly or microscopically. Unlike similar tumors described in foregoing, related papers, the only differentiated elements present were of mesodermal origin, i. e., cartilage and connective tissue of a myxomatous type. Such areas constitute a relatively small part of the mass in comparison with the cellular anaplastic portion. The presence of many mitotic figures, vacuolated and lobulated nuclei, frequent large nucleoli, scant cytoplasm, multinucleated giant cells and extensive necrosis indicates rapid growth. (This coincides with the clinical observation of rapid filling of the right side of the thoracic cavity.)

Tumors of the mediastinum are usually partly solid and partly cystic, but a few possessing no cystic element have been reported. Most of them are composed of tissues from all three germ layers and contain skin, hair, brain, cartilage, bone, smooth muscle, striated muscle, portions of the gastro-intestinal tract, etc. Others are true dermoid cysts. The lobulated structure sometimes encountered has caused different observers to suggest a resemblance to fetal parts. Malignant change in the form of "sarcomatous and carcinomatous degeneration" has been described. It is estimated that only approximately 10 per cent of the tumors are malignant except in their mechanical effect.

There are certain difficulties which confront one in attempting to arrive at a suitable name for the tumor discussed here. As defined by Ewing,[1] a teratoma is a tumor "composed of tissues and organs of one, two or three germinal layers, as monodermal, bidermal or tridermal types." If one accepts the broadest meaning of the term, it would include the tumor described here, but as teratoma always suggests multiplicity of tissues, it is realized that, applied in this case, it would lead to a mistaken conception. The name "mesoblastoma" would indicate an anaplastic tumor originating from the mesoderm but would not suggest the differentiation present in the form of cartilage and myxomatous connective tissue. The title "mixed tumor of mesenchymal origin," suggested by Mallory [2] for tumors of such composition, seems a suitable designation in this instance, as it not only points out its origin from a single germ layer but also shows that there is some degree of differentiation.

It is impossible to determine the origin of this neoplasm. It clearly did not arise from structures normally present in the mediastinum. One theory considered with regard to such tumors in this region is that they

1. Ewing, J.: Neoplastic Diseases, ed. 3, Philadelphia, W. B. Saunders Company, 1928, p. 28.

2. Mallory, F. B.: The Principles of Pathologic Histology, Philadelphia, W. B. Saunders Company, 1929, p. 406.

result from "aberrant sex cells or displaced blastomeres." [3] The monodermal characteristic of the tumor in this instance practically excludes this source from further consideration. The entodermal anlagen of the lungs and trachea are developed in a median mass of mesenchyma, dorsal and cephalad to the peritoneal cavity. The buds of the lungs grow laterally, carrying with them folds of mesoderm, which differentiate into muscle, connective tissue and the cartilage plates of the trachea and bronchi. One can only suggest that this affords a possible etiology of a connective tissue tumor should there be abnormal budding of the mesoderm at an early stage in embryologic development. The most reasonable theory of its origin is that it arose from one or more of the branchial arches. Through these structures run the primitive aortic arches, which contribute toward the formation of the aortic arch, ductus arteriosus and pulmonary arteries. The intimate embryologic relationship of these structures makes it possible to conceive the passage of a portion of a branchial arch or arches into the mediastinum during the descent of the heart.

It has been impossible to find in the literature a report of a tumor such as that which has been described. In 1927, Williams [4] stated that the following men have observed the corresponding tumors of the mediastinum: "Schults (chondromyxosarcoma), Dalton (chondromyxosarcoma), Ribbert (chondrofibro fatty) and Birkett (osteochondroma)." No references are included in that paper, and the accounts by the original authors have not been located. The names given these neoplasms, particularly the first two, suggest that they may resemble the tumor described here. Their exact constituency and origin, as well as the ages of the patients in whom they occurred, are unknown to us. The relative significance of these instances must therefore remain a matter for conjecture.

It seems wise to consider this new growth related to the class of mediastinal teratoma because of its location, undetermined etiology and general structure. Several articles have been written concerning teratoma and the subgroup of dermoid cysts of the mediastinum. Approximately one hundred and seventy cases have been reported, of which relatively few have occurred in children 12 years of age and less. In 1924, Smith and Stone [5] reviewed the literature and found nine cases in children of that age group. They reported two cases of mediastinal tumor, in one of which the growth was a teratoma and in the other

3. Wilcox, H. B., and Wollstein, M.: Mediastinal Teratoma in an Infant, Am. J. Dis. Child. **41**:89 (Jan.) 1931.

4. Williams, W. R.: Teratoid Tumors of the Thorax, M. J. & Rec. **125**:6 (Jan.) 1927.

5. Smith, L. W., and Stone, J. S.: Tumors of the Mediastinum in Children, Ann. Surg. **79**:687 (May) 1924.

a "papillary cystadenoma." In 1930, Wilcox and Wollstein [3] described a tumor containing tissues of all three germ layers occurring in an infant and brought the total number of cases to fourteen. An instance apparently not included by these authors is that reported by Smith,[6] of a dermoid cyst in an infant.

SUMMARY

The occurrence of a tumor primary in the mediastinum is rare in children, especially when the growth is noncystic and possesses malignant characteristics. The tumor described in the foregoing pages developed insidiously in a child 3 years of age and occupied a large proportion of the right side of the chest when first suspected. Pathologic study revealed a cellular, relatively anaplastic tumor showing differentiation in the form of cartilage and connective tissue of a myxomatous type. Significant features are the presence of elements solely from the middle germinal layer and the high degree of malignancy.

6. Smith, R. E.: Dermoid Cyst in the Mediastinum of an Infant, Guy's Hosp. Rep. **80**:466 (Oct.) 1930.

Progress in Pediatrics

ASSOCIATED FACIAL AND INTRACRANIAL HEMANGIOMAS

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Formerly angiomas of the brain were considered extremely uncommon and only isolated reports appeared in the literature following the first report on this subject in 1854 by Luschka,[1] a pathologist. The association of nevi of the skin with hemangioma of the brain was first pointed out by Kalischer [2] in a clinical report in 1897. Since 1928 this condition has been receiving increasing attention, mostly as a result of the publications of Cushing and Bailey,[3] Dandy [4] and Yakovlev and Guthrie.[5] Little has appeared in pediatric literature, however; as far as we know, no articles on this subject have appeared in American pediatric publications, and only few communications dealing with angioma of the brain have appeared in foreign pediatric journals. The fact that hemangiomas of the brain are often associated with nevi of the skin and other congenital stigmas, and the fact that the two most characteristic manifestations of this disease, convulsions and spastic hemiplegia, usually make their appearance in infancy or early childhood, warrant a study of this disease by the pediatrician. In addition, a study of angioma of the brain is of practical value since some patients

From the Pediatric Service of the Israel-Zion Hospital.

1. Luschka, H.: Kavernöse Blutgeschwülste des Gehirns, Virchows Arch. f. path. Anat. **6**:458, 1854.

2. Kalischer, S.: Demonstration des Gehirns eines Kindes mit Telangiectasie der linksseitigen Gesichtkopfhaut und Hirnoberfläche, Berl. klin. Wchnschr. **48**: 1059, 1897.

3. Cushing, H., and Bailey, P.: Tumors Arising from the Blood Vessels of the Brain, Springfield, Ill., Charles C. Thomas, Publisher, 1928.

4. Dandy, W. E.: Venous Abnormalities and Angiomas of the Brain, Arch. Surg. **17**:715 (Nov.) 1928.

5. Yakovlev, P. I., and Guthrie, R. H.: Congenital Ectodermoses (Neurocutaneous Syndromes) in Epileptic Patients, Arch. Neurol. & Psychiat. **26**:1145 (Dec.) 1931.

with this condition have been operated on successfully (Spiller,[6] Rogers,[7] Sachs[8] and Cushing[9]).

The case of a 5 year old boy for whom we made a diagnosis of hemangioma of the brain preoperatively forms the basis of this communication. In addition, we have attempted to collect and analyze all the cases previously reported in the literature in an effort to make this disease more generally known and to facilitate its recognition. We have divided the cases into two groups: The first group comprises those cases in which nevi of the skin occurred in association with neurologic manifestations and in which hemangiomas of the brain were seen either at operation or at necropsy. The second group consists of those cases in which nevi of the skin were present and in which hemangiomas of the brain were suspected to be present because of the neurologic manifestations and roentgenologic findings, but in which the diagnosis

TABLE 1.—*General Analysis of Cases*

	Confirmed	Unconfirmed	Total
Cases	24	58	82
Sex: Male	15	29	44
Female	7	27	34
Not stated	2	2	4
Age: Under 15 years	10	33	43
Over 15 years	12	25	37
Not stated	2	0	2
Side of lesion: Right	9	22	31
Left	10	24	34
Both sides	5	10	15
Not stated	0	2	2

was not confirmed either by operation or by necropsy (table 1 gives a general analysis). The proved cases of hemangioma of the brain without cutaneous manifestations are not included, because this type of malformation of cerebral vessels is usually of the arterial or the arteriovenous type, which, as a rule, does not produce signs and symptoms of cerebral disease until the patient is well past puberty (Brock and Dyke[10]). It is therefore a problem for the neurologist or the neurosurgeon rather than for the pediatrician.

6. Spiller, W. G.: Congenital Tumor of the Brain (Telangiectasis) and Associated Cerebral Movements, Arch. Neurol. & Psychiat. **2**:50 (July) 1919.

7. Rogers, L.: Associated Facial and Intracranial Hemangiomata, Brit. J. Surg. **21**:229, 1933.

8. Sachs, E.: Diagnosis and Treatment of Brain Tumors, St. Louis, C. V. Mosby Company, 1931.

9. Cushing, H.: Cases of Spontaneous Intracranial Hemorrhage Associated with Trigeminal Nevi, J. A. M. A. **47**:178 (July 21) 1906.

10. Brock, S., and Dyke, C. G.: Venous and Arterio-Venous Angiomas of the Brain, Bull. Neurol. Inst. New York **2**:247, 1932.

REPORT OF A CASE

S. D., a boy 5 years old, was seen by one of us (Dr. Greenwald) through the courtesy of Dr. Irving Haiken on March 18, 1935, because of a slowly progressive paralysis of three days' duration, which began in the right leg and slowly extended until the entire right side, including the face, was involved. During the examination severe convulsive seizures, limited entirely to the right side, set in; the patient's condition became so alarming that immediate hospitalization was advised.

The family history was entirely without bearing on the case and, in particular, there was no history of epilepsy, insanity or other neurologic disturbance. The child's past history revealed that he was delivered by a cesarean section. Aside from an attack of whooping cough in infancy, he was completely well until 1932 when, at the age of 2 years, he had a sudden severe gastric hemorrhage associated with a moderate amount of abdominal pain. At that time the child was placed

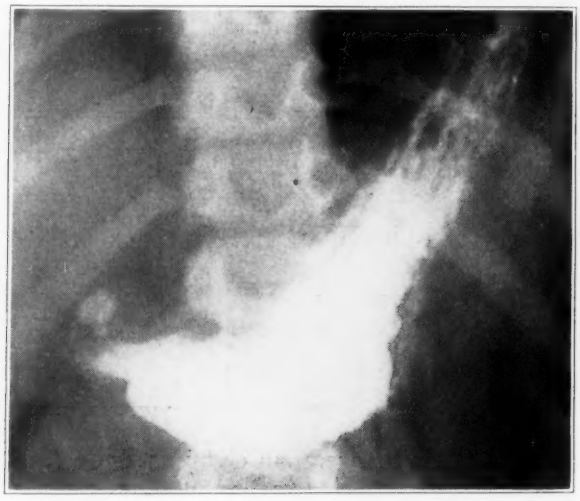

Fig. 1.—A roentgenogram of the duodenal bulb after a barium sulfate meal. Definite deformity of the bulb is present.

in a hospital for observation, but no cause for the hemorrhage could be determined; complete hematologic and physical examinations disclosed nothing relevant. Two years later, during September 1934, another severe hemorrhage occurred, necessitating a transfusion. This time the hemorrhage was not gastric but intestinal and was preceded for two days by severe abdominal pain. The child was seen by one of us (Dr. Greenwald) at that time, and a tentative diagnosis of duodenal ulcer was made and was apparently substantiated by the results of a subsequent roentgenologic examination of the gastro-intestinal tract (fig. 1). Another point of interest in the past history is that the child complained of dizziness and severe headache when exposed to the sun.

The present illness began on March 16, 1935, when weakness of the right leg was noticed; the child was unable to get on his bicycle without help. He was put to bed, and on the following day the mother observed that the boy did not move his right hand. During the same night his hand began to twitch. The

temperature was elevated to 102 F. on the day prior to admission to the Israel-Zion Hospital.

On admission to the hospital the patient was stuporous and cyanotic. There was drooling from the mouth; a complete hemiplegia of the right side was present; there was also a lateral nystagmus to the right with deviation of the eyes in the same direction. The fundi were normal. Abdominal and cremasteric reflexes on the right side were absent; the right knee jerk and ankle jerk were absent, although they were present on the left side; a positive Babinski reflex, but no clonus, was present on the right side. A large pale vascular nevus occupied the entire lower half of the left ear and extended with an almost imperceptible fading over the scalp to the left temple and cheek but did not cross the midline. The left ear was larger than the right (fig. 2). A faint blush, consisting of dilated vessels, was also present over the left side of the body, arm, leg, buttock and thigh. The remainder of the physical findings were normal.

Immediately after admission to the hospital the child became progressively more stuporous and continued to have clonic convulsions of the right arm and leg and

Fig. 2.—Photograph of the patient on April 15, 1935, showing the nevus on the left side of the face; the area most involved is about the ear.

of the entire right side of the face. A diagnosis of cerebral hemorrhage, due possibly to the presence of a nevus over the left cortical area, was made. Lumbar puncture was immediately performed, and the fluid was withdrawn under normal pressure. It was clear, not bloody or xanthochromic, and dextrose was present in normal amount; there were 4 cells per cubic centimeter—all lymphocytes; the Wassermann and colloidal gold tests of the spinal fluid were negative. An immediate complete examination of the blood was made to rule out a blood dyscrasia as one of the possible causes of intracranial bleeding. The coagulation time was eight minutes; the bleeding time, three minutes; the platelet count was 200,000; the hemoglobin content was 60 per cent (Sahli); the red blood cell count was 3,800,000; the white blood cell count, 19,800, 70 per cent of which were polymorphonuclear leukocytes, 26 per cent lymphocytes and 4 per cent monocytes. Definite achromia, poikilocytosis and anisocytosis were observed. The Wassermann and Rosenthal tests of the blood were negative. There were 123 mg. of dextrose, 22.4 mg. of urea nitrogen and 197 mg. of cholesterol per hundred cubic centimeters of blood.

A consultation was held with a neurosurgeon, Dr. Ira Cohen, who confirmed the diagnosis and advised immediate operative intervention. Before the operation one-half grain (0.03 Gm.) of sodium amytal was given intravenously; the convulsions, which had been refractory to the usual methods of treatment, ceased almost at once after the injection of the amytal.

Operative Procedure.—Under local anesthesia, a 6 cm. incision was made over the left parietal region, and a button of bone was removed; the opening in the bone was then enlarged to about the size of a quarter of a dollar. Immediately on opening the dura mater, a pulsating mass was seen, covered with a diffuse vascular structure, which occupied the cortex throughout the entire exposed field. The mass consisted of small and several larger veins. Because of the limited exposure, an exact classification could not be made, but the impression gained was that the lesion resembled most closely one of the cavernous angiomas. It did not involve the dura mater. Whether or not it was limited to the leptomeninges or to the cortex, or whether it involved both, could only be conjectured, as no further exploration was attempted. As Dr. Cohen believed that there was no surgical measure which could be utilized for the removal of this lesion, suture of the wound was carried out with silk, closing first the muscle, then the fascia, then the galea and finally the skin. The dura was left open for decompression.

Postoperative Course.—The immediate postoperative condition was poor; cyanosis and stupor persisted; twitchings, but no convulsions, occurred. These were successfully controlled by the intramuscular injection of 2 grains (0.13 Gm.) of sodium amytal. Several hours after the operation slight improvement was noticed; the patient lay quietly and at times actually moved his right arm and leg. Definite improvement was observed on the following day; the cyanosis disappeared; the sensorium was clearer, although the child was unable to speak; the eyes were now deviated to the left, and no nystagmus was present. Both knee jerks were active. On March 20 no definite change was seen. The boy lay quietly in bed but would at times cry out. A tarry stool was passed, indicating active bleeding in the intestinal tract.

It was now suspected that the patient had a nevus involving the gastro-intestinal tract; in addition, it was likely that ulceration of the nevus had taken place and was responsible for the changes in the duodenal bulb noticed in the roentgenologic studies made six months previously. Snake venom in doses of 0.2 cc. was injected intracutaneously every other day to control the bleeding. On March 21, at 2 a. m., severe clonic convulsions of the right side of the face and of the right arm and leg set in and lasted two hours in spite of the administration of sodium amytal. Following these convulsions the child seemed fairly alert and was able to speak a few words very indistinctly. The fundi were normal. The visual fields could not be examined successfully because of lack of cooperation on the part of the child. From this time on improvement was steady but slow; motion gradually returned to the paralyzed side; the sensorium became clearer and speech more distinct.

Roentgenologic examination of the skull showed normal conditions; a special search for calcification was made, but it was not found. There was also no evidence of tumefaction or rarefaction secondary to local pressure.

Subsequent examinations of the stool for blood disclosed none clinically or microscopically. The temperature, gradually subsiding, became normal on the seventh day after the operation and remained so until the child was discharged from the hospital. On March 26, 100 mg. of radium pack was applied over the operative site in the left parietal area. It was left in situ for forty-eight hours.

The radium pack consisted of ten 10 mg. needles filtered through 1.2 mm. of brass and 1 mm. of lead. The target distance was 2.5 cm., and the size of the area exposed, 10 by 7 cm. The final dosage was 4,800 milligram hours of radium. There was no reaction. Three days after the radium was applied the child was discharged from the hospital. Examination at that time showed a partial spastic paralysis of the right arm and leg; speech was present, although somewhat indistinct; a slight lateral nystagmus to the left was noticed. No convulsions or twitchings were observed for five days before discharge from the hospital.

Since then the patient has been under the observation of the family physician who, at this writing, reports that the boy is in excellent condition and has had no convulsions. He runs about and has complete use of his arms and legs; at times there is a slight indistinctness in his speech, but this is not constant. There seems to be no impairment of mentality; the boy is bright, answers questions intelligently, and enters into games with his playmates. The area exposed to radium is completely devoid of hair.

COMMENT

Pathogenesis.—There is a difference of opinion as to whether hemangiomas are congenital vascular anomalies or neoplasms. Luschka,[1] Streeter,[11] Ruehl,[12] Levine,[13] Borst[14] and Schueck[15] are of the opinion that they occur as a result of maldevelopment of the blood vessels of the brain and skull. Heine,[16] Ribbert,[17] Simmonds[18] and Virchow,[19] on the other hand, believe that they are true neoplasms.

Luschka[1] was the first to point out that this type of blood vessel tumor of the brain results from a congenital abnormality of the embryonal capillary vascular system. He stated that the hemangioma of the brain which is associated with cutaneous nevi arises from sequestration of a small portion of the embryonic capillary vascular system.

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11. Streeter, C. L.: The Developmental Alterations in the Vascular System in the Brain of the Human Embryo, publication 271, Carnegie Institution of Washington, 1918, p. 5.

12. Ruehl, A.: Ueber einen Fall von Varicenbildung im Gehirn in Verbindung mit einem Angioma racemosum, Beitr. z. path. Anat. u. z. allg. Path. **82**:163, 1929.

13. Levine, V.: Angiomatous Malformations of the Brain: Report of Two Cases of Angioma Racemosum, Arch. Path. **15**:340 (March) 1933.

14. Borst, M.: Echte Geschwülste, in Aschoff, L.: Pathologische Anatomie, Jena, Gustav Fischer, 1913, p. 497.

15. Schueck, F.: Ueber Wesen und Entstehung des Angioma arteriale racemosum, Inaug. Dissert., Berlin, O. Francke, 1885.

16. Heine, C.: Ueber Angioma arteriale racemosum (Aneurysm Cirsoides) am Kopfe und dessen Behandlung, Vrtljschr. f. d. prakt. Heilk. **103**:1, 1869; **104**:1, 1869.

17. Ribbert, H.: Ueber Bau, Wachstum und Genese der Angiome, nebst Bemerkungen über Cystenbildung, Virchows Arch. f. path. Anat. **151**:381, 1898.

18. Simmonds, M.: Ueber das Angioma racemosum und serpentinum des Gehirns, Virchows Arch. f. path. Anat. **180**:280, 1905.

19. Virchow, R.: Ueber die Erweiterung kleinerer Gefässe, Virchows Arch. f. path. Anat. **3**:425, 1851.

The clinical picture of this type has recently been called by French observers the "neurocutaneous syndrome." Yakovlev and Guthrie [5] expressed the belief that in the vascular neurocutaneous syndrome one deals not with a neoplastic condition but with an angiomatous malformation of differentiated blood vessels; this syndrome differs, however, from the two other types of neurocutaneous lesions (neurofibromatosis and tuberous sclerosis) in the period of embryogenesis at which the disturbance occurs.

Cushing,[9] in his first publication on the subject in 1906, stated that nevi occurring on the face show a tendency to conform in outline with the distribution of one or more branches of the trigeminal nerve, and that vascular nevi of the face are associated with lesions of the meninges because of a prenatal underdevelopment of the trigeminal nerve. In one case which came to autopsy, the patient had a facial and a meningeal nevus; on the same side as the nevus was an undeveloped gasserian ganglion. As a matter of fact, in many of the instances collected in this report the nevi of the skin followed the area of distribution of one or of all the branches of the trigeminal nerve.

Classification.—Dandy [4] described two groups of blood vessel tumors of the brain: (1) a group comprising arteriovenous abnormalities and (2) a group comprising only venous abnormalities. He divided the venous abnormalities into four subgroups: (*a*) abnormal venous plexuses in different parts of the brain, the so-called plexiform angiomas; (*b*) venous aneurysms or diverticulums of the superior longitudinal sinus; (*c*) angiomatous cysts; (*d*) cavernous hemangiomas. In reviewing Dandy's cases we found that only in the fourth subgroup, that of cavernous hemangiomas, was there an association with congenital nevi elsewhere in the body.

Cushing and Bailey [3] divided vascular malformations of the brain into three groups: (1) telangiectases, (2) venous angiomas and (3) arteriovenous or arterial angiomas. They, too, found that nevi of the skin are associated only with venous angiomas. The other two types are practically never associated with nevi of the skin. There are exceptions, however, as may be seen from the report of Brock and Dyke.[10] They reported a case of arteriovenous angioma associated with telangiectasis of the left side of the face. Similarly, a case of multiple cutaneous telangiectasis associated with cerebral angiomas of the telangiectatic type was described by Kufs.[20] Cushing and Bailey [3] subdivided the venous angiomas associated with nevi of the skin into three anatomic varieties: (*a*) simple, (*b*) serpentine and (*c*) racemose or circinate

20. Kufs, H.: Ueber heredo-familiäre Angiomatose des Gehirns und der Retina, ihre Beziehungen zu einander und zur Angiomatose der Haut, Ztschr. f. d. ges. Neurol. u. Psychiat. **113**:651, 1928.

varices. They also divided the venous angiomas into the superficial and the deep type. The former is found on the surface of the brain, and the latter extends into the brain in a wedge-shaped manner.

It is possible to differentiate between the arteriovenous and the venous angiomas, first, because the former, with few exceptions, are not associated with lesions of the skin, and, second, because there are differences in the symptoms and in the objective findings. For example, the arteriovenous angiomas are practically always accompanied by definite cardiovascular changes. The cardiovascular findings are: systolic cardiac murmurs, enlargement of the heart to the left, enlargement of the carotid or of the temporal arteries, a bruit over the intracranial lesion and a low diastolic pressure. In Brock and Dyke's [10] cases the average diastolic pressure was 80 in the venous group and 50 in the arteriovenous group. It might be well to add that the arteriovenous aneurysms of Dandy's [4] classification correspond to the arteriovenous angiomas of the classification made by Cushing and Bailey.[3]

Pathology.—Any structure provided with blood vessels may be the seat of angiomas; however, as Yakovlev and Guthrie [5] pointed out, the blood vessels of the nervous system, skin, retina and certain glandular organs seem to be the tissues of choice. In their first case angiomas of the lung and of the large intestine were also found at postmortem examination. In our case, although positive proof is lacking, the history of severe gastric and intestinal hemorrhage and the roentgenologic evidence of deformity of the duodenal bulb point to the presence of angiomas of the stomach and small intestine.

Gutmann, Laval and Schlumberger [21] reported the case of a patient 45 years old who had had a facial nevus since birth and who for many years had suffered from severe gastric and intestinal hemorrhages. Roentgenologic examination showed a deformity of the duodenal bulb similar to that found in our patient. Because of the absence of pain and the recurrence of bleeding in spite of gastroenterostomy, they concluded that their patient was not suffering from a duodenal ulcer.

According to Brock and Dyke,[10] the blood vessel malformations occur usually in the cerebrum and less often in the cerebellum or the brain stem. Cushing and Bailey [3] showed that angioblastic tumors are confined practically to the cerebellum (Hippel-Lindau disease) while the angiomatous malformations are more common in the cerebrum, the proportion being 14:2. The former are combined with malformations of the retina; occasionally, however, retinal changes are also found with venous angiomas. These malformations constitute about 1 per cent of the brain tumor group (Dandy [4]).

21. Gutmann, R. A.; Laval, J., and Schlumberger, C. S.: Hémorragies digestives chez un angiomateux, Bull. et mém. Soc. méd. d. hôp. de Paris **48**:151, 1932.

According to Dandy, grossly, venous angiomas are red-brown, spongelike and compressible, well circumscribed, but never encapsulated. Some tumors are soft, others are firm, depending on the size of the blood spaces and the amount of connective tissue. The tumors do not pulsate. Bleeding is principally venous. The growths vary from minute structures to masses larger than a fist. Microscopic examination shows endothelial-lined blood spaces with scant or nonsupporting coats, with a minimal amount of connective tissue. Thrombosis and calcification frequently occur.

Cushing and Bailey [3] stated that, histologically, one sees many cut blood vessels, dilated and irregular, separated by degenerated and "gliosed" brain tissue. These lesions may be superficial or deep.

Various observers have found hypoplasia of the brain, microgyria, thickened pia, tortuous vessels and areas of calcification. Hebold,[22] Kalischer,[2] and Volland [23] reported thickening of the bone. As a matter of fact, it is not uncommon to encounter involvement of the diploe of the cranial vault. Hebold believed that the malformations are more common on the left side. Spiller [6] found enlargement and widening of the meningeal vessels. Not infrequently multiple tumors ranging in size from that of a pinhead to that of a pea are encountered over a wide area. Calcification is observed usually in the outer layer of the cortex, not in the pia. It consists of numerous small, mostly microscopic granules of lime salts localized in the cortex; the nerve tissue is destroyed and replaced by neuroglia in the involved areas. The lime deposits are found not only in the substance of the tumor but also in the capillaries of the adjacent brain tissue. The salt found is almost invariably calcium carbonate. The calcification of vessels and of areas of the brain is responsible for the shadows seen in the roentgenograms. The shadow is seen most often in the area of the occipital lobe. This does not mean, however, that the angiomatous lesion is necessarily limited to that area. Rarely, the lime deposits constitute the sole evidence of angioma (Stewart[24]).

In 3 cases nevi were found in organs other than the brain (Kufs,[20] Yakovlev and Guthrie [5] and Luschka [1]). In our case the evidence pointed to the presence of an angiomatous lesion in the gastro-intestinal tract.

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22. Hebold, Otto: Haemangiom der weichen Hirnhaut bei Naevus vasculosis des Gesichts, Arch. f. Psychiat. **51**:445, 1913.

23. Volland, R.: Ueber zwei Fälle von zerebralen Angiom nebst Bemerkungen über Hirnangiom, Ztschr. f. d. Erforsch. u. Behandl. d. jugendl. Schwachsinns **6**:130, 1912.

24. Stewart, R. M.: Case of Infantile Hemiplegia Associated with Facial Naevus and Mental Defect, J. Neurol. & Psychiat. **12**:47, 1931.

Symptoms.—Cases have been reported in which symptoms were noticed at birth (Rogers,[7] Weber,[25] Cockayne,[26] Brushfield and Wyatt,[27] Williams[28] and Yakovlev and Guthrie[5]). In most instances, however, symptoms began in infancy or early childhood. The onset in the greatest number of cases occurred between the ages of 6 months and 1 year (table 2). Convulsions were the most outstanding and frequent symptom and ushered in the disease in 68 per cent of the reported cases (fig. 3). They were general or jacksonian. Of the 82 reported cases there were 68 (82.9 per cent) in which seizures were present either as the first or as a later symptom; convulsions were jacksonian in 33 (40.2 per cent) of the 82 cases and generalized in 14 (17 per cent). The nature of the seizures in the remaining 21 cases was not mentioned (fig. 4). In several instances mild convulsions occurred only infrequently at the onset. Later they became more severe and more

TABLE 2.—*Age at Onset of Symptoms*

Age at Which Symptoms Appeared	Confirmed Cases	Unconfirmed Cases	Total
At birth	2	6	8
Birth to 6 months	2	11	13
6 months to 1 year	4	14	18
1 to 5 years	3	5	8
5 to 10 years	3	3	6
10 to 20 years	1	4	5
20 to 40 years	1	3	4
Over 40 years	1	1	2
Not stated	7	11	18
	24	58	82

frequent; indeed, in some patients even status epilepticus developed (Yakovlev and Guthrie[5]). Some observers have reported cases in which auras preceded the convulsions; in a case reported by Rotgens and others[29] narcolepsy preceded the convulsive seizures.

The convulsions are due, in the opinion of Cushing and Bailey,[3] to thrombosis or hemorrhage of the middle cerebral artery. Yakovlev and Guthrie,[5] however, stated it as their opinion that the developmental

25. Weber, F. P.: Notes on Association of Extensive Haemangiomatous Naevus of the Skin with Cerebral (Meningeal) Haemangioma, Especially Cases of Facial Vascular Naevus with Contralateral Hemiplegia, Proc. Roy. Soc. Med. (Sect. Neurol.) **22**::431, 1929.

26. Cockayne, E. A.: Hemiplegia with a Very Extensive Nevus, Brit. J. Child. Dis. **11**:25, 1914.

27. Brushfield, T., and Wyatt, W.: Hemiplegia Associated with Extensive Nevus and Mental Defect, Brit. J. Child. Dis. **24**:98, 1927.

28. Williams, E. R.: Two Cases of Calcified Intracranial Hemangioma, Brit. J. Radiol. **7**:564, 1934.

29. Rotgens and others, cited by Cavel, L.: L'angiome calcifié des meninges, Thèse de Paris, 1931.

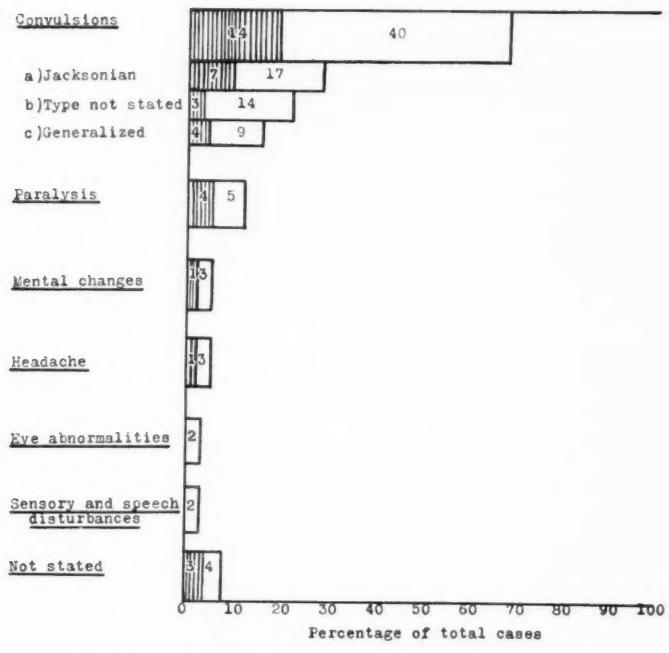

Fig. 3.—The most prominent symptoms at the onset of the disease. In all the charts the shaded portions represent the confirmed cases; the blank portions, the unconfirmed cases. The numbers enclosed are the numbers of cases.

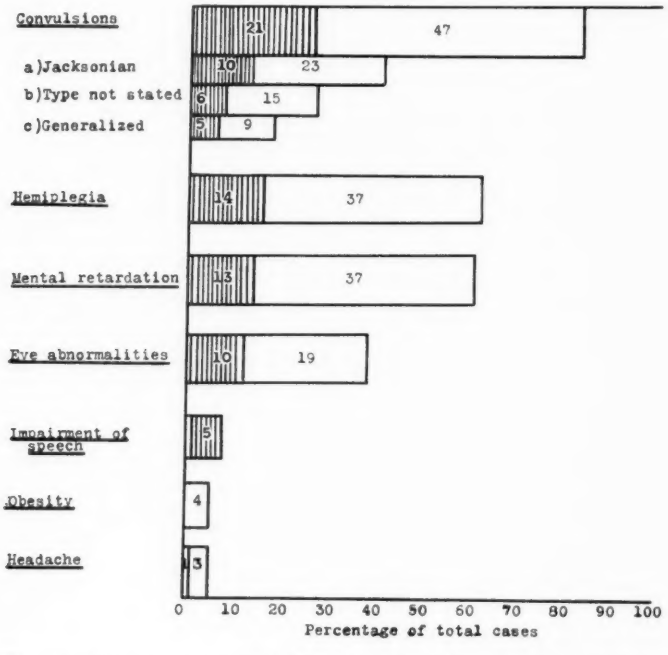

Fig. 4.—The symptoms and signs in the order of their frequency.

factor is more important than the subsequent lesion: "It is the development of functional integration of the higher levels of the central nervous system, gravely compromised at its very root in the course of embryogenesis, that creates the predisposition. The convulsive state in such cases may emerge without any subsequent lesion, or any lesion may bring it out on the predisposed ground." According to them, therefore, a congenital predisposition is created by structural maldevelopment in the brain, and the vascular anomaly is a conspicuous part of the malformation which affects the cerebrum as a whole.

Stewart,[24] however, stated that in his experience "inequality of the two cerebral hemispheres is not an uncommon finding in the brains of persons who exhibit mental defect without cutaneous naevus; the condition seems to be the result of a simple developmental arrest, and when associated with congenital infantile hemiplegia, as is often the case, examination of the cortex reveals little else than paucity of the cortical neurones." In his opinion, therefore, the meningeal angioma is an associated developmental anomaly which has nothing to do with either the developmental defect or the infantile hemiplegia. Our impression, from a study of the cases reported, is that Stewart's view is incorrect.

The next symptom in the order of importance and frequency is paralysis; it occurred in 51 cases (62.2 per cent [fig. 4]). Paralysis was always present on the side opposite the lesion except in 2 instances, Oppenheim's [30] case and Hugo's [31] case. In most instances a complete hemiplegia was present; this was followed by contractures and the usual sequelae. At times, however, only an arm or a leg was involved. Occasionally, as in our case, the paralysis was of the creeping type, beginning in the leg and gradually involving the entire half of the body. At times, the paralysis was fleeting, with complete recovery of the involved limb (Laignel-Lavastine, Delherm and Fouquet,[32] 1 case; Isenschmid,[33] 1 case, and Greenwald and Koota, 1 case). The paralysis was always spastic except during the first few hours; at that time the deep reflexes were sometimes absent; later, however, they became hyperactive. Ankle clonus and other evidences of a lesion of an upper motor neuron became manifest. Arrested development and contractures of

30. Oppenheim, H.: Ueber klinische Eigentümlichkeiten kongenitalen Hirngeschwülste, Neurol. Centralbl. **32**:3, 1913. Oppenheim explains the discrepancy between the side of the lesion and the side of the hemiplegia as due to a noncrossing of the pyramidal tract.

31. Hugo, H. S.: Case of Paresis of Left Arm and Both Legs Associated with Nevus and Mental Defect, J. M. A. South Africa **1**:534, 1927.

32. Laignel-Lavastine, Delherm and Fouquet: Epilepsie jacksonienne par angiome cérébral avec naevus frontal, Rev. neurol. **1**:475, 1929.

33. Isenschmid, R.: Die klinischen Symptome des cerebralen Ranken-angioms, München. med. Wchnschr. **59**:243, 1912.

the involved limbs usually followed. Dimitri's [34] case and ours were exceptions.

No definite relationship in time can be established between the onset of the convulsions and the paralysis; in most cases, however, the paralysis seemed to follow immediately after the seizure (Cushing,[9] Weber,[25] Brushfield and Wyatt,[27] Lannois and Bernourd,[35] Vincent and Heuyer,[36] Brock and Dyke [10] and Yakovlev and Guthrie [5]). On the other hand, cases have been reported in which hemiplegia did not follow the convulsions until a month or even a year had elapsed (Schaefer [37] and Kalischer [2]). Occasionally hemiplegia preceded the convulsions by many years (in the case of Lannois and Bernourd,[35] nine years; in Spiller's [6] case, eleven years).

Mental Retardation.—Mental changes varying from mild deficiency to complete amentia were present in 50 cases (60.9 per cent [fig. 4]). Rarely, the mental changes stood in the foreground, and the patient showed all the characteristics of a low grade idiot or imbecile. Thus, in a hospital for mentally defective children Brushfield and Wyatt [27] found that 3 of 2,312 patients presented the syndrome characteristic of angioma of the brain described in this communication—namely, cutaneous nevus, hemiplegia and mental deficiency. Two of these children were low grade imbeciles and the third was an idiot.

In most of the reported cases, however, the children were simply mentally retarded and showed only impairment of speech or one or more of the following mental disturbances: faulty memory, bad judgment, failure of comprehension, inability to fix the attention. In many instances the child showed a mental age that was only slightly behind the actual age. It should be emphasized, however, that occasionally cases are encountered without mental changes.

Eye.—Ocular abnormalities play an important part in the symptomatology of this disease; they occurred in 29 cases (36.2 per cent [fig. 4]). Unilateral exophthalmos was encountered the most frequently and was associated with blurred or double vision and even with blindness. The importance of buphthalmos as a diagnostic sign was stressed by Moore.[38] He stated that in every case of buphthalmos a careful roentgenologic examination of the skull should be made to detect the possible presence

34. Dimitri, V.: Tumor cerebral congenito (angioma cavernosa), Rev. Asoc. méd. argent. **36**:63, 1923.

35. Lannois and Bernourd: Enorme naevus angiomatous de la face avec hémiplégie spasmodique et épilepsie, Nouv. iconog. de la Salpêtrière **11**:446, 1898.

36. Vincent, C. L., and Heuyer, G.: Présentation de deux cas d'angiome veineux cérébral, Rev. neurol. **1**:509, 1929.

37. Schaefer, W.: Ueber einen Fall von halbseitigem Gehirn- und Hauthaemangiom, Monatschr. f. Kinderh. **50**:35, 1931.

38. Moore, R. F.: A Hemangioma of the Meninges Involving the Visual Cortex, Brit. J. Ophth. **13**:252, 1929.

of an intracranial nevus. Ocular palsies, inequality of the pupils, homonymous hemianopia, choked disk, optic atrophy, nystagmus, retinal angiomas, papillitis, choroidal atrophy, congenital glaucoma and engorgement of retinal vessels have all been described in this disease. Although angiomatous involvement of the retinal vessels is far more common in Hippel-Lindau disease, it was observed in a case of cavernous angioma of the brain by Yakovlev and Guthrie.[5] We wish to emphasize the fact that papilledema is not nearly so common with this condition as with tumor of the brain. Headache, vomiting and choked disk are infrequent because cavernous angiomas rarely attain sufficient size to produce intracranial pressure. Indeed, Sachs[8] considered attacks of jacksonian epilepsy occurring at long intervals, periods of unconsciousness of long duration, absence of signs of increased intracranial pressure and a slow progression of symptoms characteristic of this disease. Other signs and symptoms described were tremors, impairment of speech, vertigo, vomiting, headache, deafness, urinary incontinence, obesity and

TABLE 3.—*Duration of Latent Periods*

Four Confirmed Cases		Ten Unconfirmed Cases			
Case 23	8 years	Case 52	14 years	Case 36	5½ years
Case 7	1½ years	Case 3	8¾ years	Case 6	2 years
Case 4	1 year	Case 35	7 years	Case 54	1 year
Case 6	9 months	Case 10	7 years	Case 23	1 year
		Case 46	6 years		

intestinal bleeding (fig. 4). Epistaxis may be due to the presence of a nevus on the nasal septum (Brockaert[39]). Although headache is not so prominent a symptom as it is with intracranial tumor, it was present in 4 cases. Our patient suffered from intense headache when exposed to the sun. Obesity is noted at times and is believed to be due to an involvement of the pituitary gland by some observers (Weber[23] and Hebold[22]). Other stigmas of degeneration encountered were: a high arching of the palate, asymmetry of the ears, underdevelopment of the testicles and flattening of the nasal bridge. Symptom-free periods of long duration, i. e., latent periods, are characteristic of this condition. In 14 cases long latent periods were observed (table 3). Indeed, Cavel[40] considered the latent period of diagnostic value. The reason that long latent periods occur is that growth of the lesion takes place very slowly; in fact, the angioma may remain stationary in size for a long time. Increased activity may occur in later life in response to some stimulus, especially that of trauma (Dimitri[34]); this is particularly true of the

39. Brockaert, J.: Contribution à l'étude des anéurysms circoïdes de la tête, Bull. Acad. roy. de méd. de Belgique **22**:360, 1908.

40. Cavel, L.: L'angiome calcifié des meninges, Thèse de Paris, 1931.

arteriovenous type (Cushing and Bailey[3]). The symptoms described in the foregoing paragraph probably result from one or more of the following occurrences: (1) hemorrhage into the angioma, (2) thrombus formation in the angioma or (3) tumorous formation in the cavernous angioma. Under these conditions the signs and symptoms are the same as with any other tumor of the brain (rare).

It should be mentioned that symptoms and signs may be entirely absent and that the intracranial nevus may be an accidental discovery. This is rare and, so far as we know, has occurred in only 1 case (Kufs[20]). A familial factor was present in a number of these cases, i. e., nevi of the skin and neurologic manifestations were present in other members of the patient's family.

Nevus of the Skin.—As previously stated, the type of cutaneous nevus which is more commonly associated with meningeal angioma is the cavernous and not the telangiectatic type. The former is usually dark purple or the color of port wine. As a rule, it is flat and composed of a superficial capillary plexus; however, hypertrophy of the tissues is occasionally present. Often this type of nevus is covered with rough, nodular skin (naevus vinosus). The nevus is not always purple or wine-colored, nor is it always prominent. At times, as in our case, it is pale and hardly discernible. The size of the lesion may vary from that of a minute pinhead to that of a nevus covering the entire head, face, neck and greater part of the body, as was recently reported by Weber[25] in the case of a 28 year old woman. The cavernous angioma may involve the face alone, following the distribution of one or more branches of the trigeminal nerve and seldom crossing the midline; or it may involve the trunk and the extremities. In some of the cases reviewed here both sides of the face and the mucous membranes were involved. At times, a cavernous nevus was found on the lips and the tongue, where it formed large nodular purple masses, producing distortion. This type of nevus is usually permanent and shows no tendency to disappear spontaneously.

The telangiectatic variety is seldom associated with a meningeal angioma. It appears as a flat or slightly elevated bright red patch and is usually found at an angle or a fissure about the face or neck. The nevi of the skin practically always occur on the same side as the cerebral lesion. Exceptions to this are rare; instances have been reported by Vincent and Heuyer,[36] Krabbe[41] and Subirana.[42] With the arteriovenous aneurysm nevi of the skin are not present, but the

41. Krabbe, K. H.: Facial and Meningeal Angiomatosis Associated with Calcifications of the Brain Cortex: Clinical and Anatomopathologic Contribution, Arch. Neurol. & Psychiat. **32**:737 (Oct.) 1934.

42. Subirana, A.: Vascular Neurocutaneous Syndrome, Arch. de neurobiol. **13**:1099, 1933.

cutaneous vessels may be dilated and may reach a size from three to four times the normal.

Roentgenologic Findings.—While it has long been known that calcification of a meningeal angioma is not uncommon, the finding was introduced as a diagnostic measure only in comparatively recent times, by Wissung [43] in 1921. Before the Radiologic Society of Copenhagen he presented a man with a facial nevus the color of port wine in whose case a roentgenogram of the skull had revealed an unusual shadow corresponding to the pial vessels. Since then similar observations have been made by Marque,[44] Dimitri,[34] Weber,[25] Brushfield and Wyatt,[27] Vincent and Heuyer,[36] Dunn [45] and many others. The characteristic shadow has a double contour and has been variously described as tortuous, racemose and sinuous. It occurs as a result of calcification of the angiomatous areas. In some cases the shadows had no definite outline and were seen merely as massive areas of calcification. In most cases the shadows were seen in the region of the occipital lobe (Levine [13])

TABLE 4.—*Results of Roentgenologic Examination of the Skull*

	Confirmed Cases	Unconfirmed Cases	Total
Number of cases examined roentgenographically	7	32	39
Positive findings:			
1. Calcified areas			
2. Tortuosity of vessels	5	29	34
Negative findings	2	5	7

and, with few exceptions (Krabbe [41] and Subirana [42]), occurred on the same side as the cutaneous lesion. Whether or not the shadows increase in size with time is difficult to say since there is only 1 case on record which was studied roentgenologically for a sufficiently long period of time. Cushing [9] followed a case with roentgen studies for eight years and observed no changes. Other cerebral changes observed on roentgenologic examination are: atrophy of the brain, markedly increased vascularization and opacity in the region of the involvement. Roentgenologic examination of the skull should be made in every case in which it is suspected that a hemangioma is present. When changes are observed they are usually typical and are of tremendous aid in diagnosis. For example, characteristic changes were seen in 34 of the 39 cases in which the skull was examined roentgenologically. In 5 cases no roentgenologic changes were observed (table 4). Encephalography has also been employed in the diagnosis of this disease (Schaefer [37]).

43. Wissung, cited by Krabbe.[41]

44. Marque, A.: Consideraciones sobre angiomas en la infancia, Riv. otoneuro-oftal. **1**:202, 1927.

45. Dunn, L.: X-Ray as a Diagnostic Aid in Cases of Hemangioma, Ann. Surg. **82**:880, 1925.

Finally, we wish to emphasize the fact that two or more of the following signs and symptoms were encountered in every case: (1) the presence on the face of a nevus the color of port wine, which usually followed the distribution of one or more of the branches of the trigeminal nerve; (2) convulsive seizures which were most often jacksonian; (3) spastic hemiplegia on the side opposite the nevus; (4) mental retardation; (5) a serpentine or tortuous shadow in roentgenograms of the skull, usually seen in the region of the occipital lobe.

In connection with the diagnosis of this disease we wish to emphasize that in every case of so-called idiopathic epilepsy a careful search

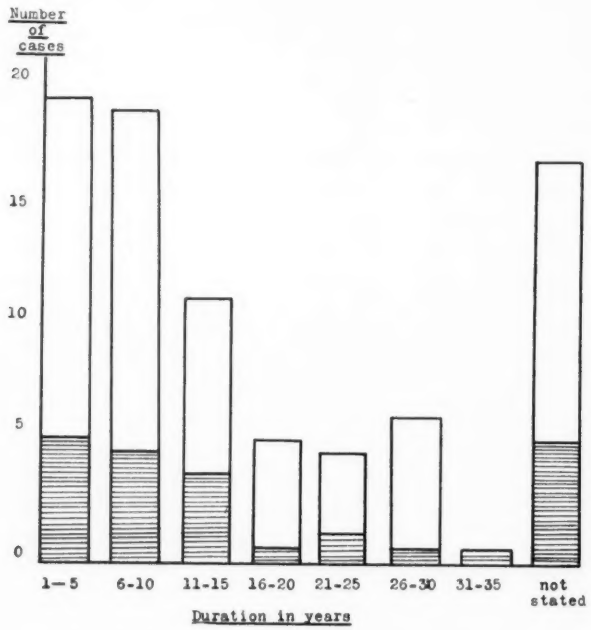

Fig. 5.—The duration of life in years from the time symptoms and signs were first observed.

should be made for a nevus about the face, head or neck. If a nevus is present, a careful roentgenologic search for an angioma of the brain is indicated.

Prognosis.—The immediate outlook as to life is not bad. So far as we know, no patient died immediately or shortly after the onset of convulsions or hemiplegia. The majority of the patients died in the second and third decades of life. A certain number of the patients lived well on into middle age (fig. 5). It should be mentioned that spontaneous retrogression is possible, particularly if the lesion is not raised (Hebold [22]). On the whole, the prognosis is poor.

Treatment.—Three distinct methods of treatment of this disease are: operation, irradiation and a combination of both. There is a difference of opinion as to the value of operative intervention. Thus, Cushing and Bailey [3] stated that "it is nothing less than foolhardy to attack one of the deep-seated racemose lesions . . . even in the superficial variety there is little encouragement to be had on the side of operative therapy." They show further the futility of extirpation or ligation which, they claimed, in most instances led to calamitous results. On the other hand, Dandy [4] expressed the belief that the only satisfactory treatment is operative intervention and that the lesion should be extirpated when possible. The nature of the operative intervention advised

TABLE 5.—*Operations with Recovery*

Date	Author	Age of Patient, Years	Operative Procedure	Result
1906	Cushing [9]	5	Preoperative ligation of external carotid artery; freeing adhesions between cortex and meninges	Marked improvement for six months
1912	Isenschmid [33]	9	Ligation of common carotid artery	Improvement
1915	Sachs [8]	10	Ligation of vessels of tumor	Freedom from symptoms for fifteen years
1919	Spiller [6]	12	Incision of dura and exposure of nevus	Cessation of convulsions; mental improvement
1928	Kohnstam [46]	45	Local extradural insertion of radium	Definite benefit
1933	Rogers [7]	7	Ligation of angiomatous mass; 2 months later tying off of internal carotid	Great improvement; only two fits in year after operation
1934	Della Torre: Riv. di neurol. **7**: 281, 1934	12	Ligation of most prominent angiomatous vessels	Marked diminution in frequency and severity of convulsions
1935	Greenwald and Koota: Am. J. Child. Dis. **51**: 868, 1936	5	Decompression in left parietal area followed by radiotherapy	Patient followed for six months after operation; complete disappearance of symptoms

ranges from that of a simple decompression, as in our case, to that of removal of the nevus. Ligature of every vessel in the operative field has been attempted. Spiller [6] advised against extensive ligation and reported 2 cases in which ligation was followed with disastrous results: in one patient hemiplegia developed, and in the other, a hemorrhage of the brain. Death results not infrequently from hemorrhage or meningitis following operation. Rogers [7] afforded his patient considerable relief by occluding the blood supply to the angioma by ligation and later tying off the internal carotid artery on the affected side. Cushing [9] reported the case of a patient who was benefited by the reverse of this procedure: The external carotid artery was first tied off and then the skull was opened. Nothing else was done except to free adhesions (table 5).

TABLE 6.—*Summary of Data in Unconfirmed Cases*

Case	Author	Age	Sex	Lesion of Skin	Roentgen Findings	Comment
1	Galezowsky: Ann de dermat et syph. **19**: 242, 1898	9 mo.	F	Congenital nevus in form of acne rosacea covering face, forehead, and scalp; entire face livid; nevus over head, stopping at neck and then extending to scalp	.....	Buphthalmos, left eye larger than right; lateral nystagmus; fundus normal
2	Lannois and Bernourd[35]	20 yr.	F	Flat nevus of left side of upper lip, forehead and temple	Calcification	
3	Lannois and Bernourd[35]	20 yr.	F	Wine-colored nevus, mostly on left side, of tongue, cheek and lips, but spread to right; hypertrophy of left cheek	.....	Onset at 5 years with convulsions, followed by right hemiplegia Onset at 3 months of age after supposed fall from cradle, followed by weakness of left side; hemiplegia of left side; epileptic fits, starting at 9 years; slight mental retardation; exaggerated deep reflexes on left and right sides
4	Cassirer: Neurol. Centralbl. **21**: 32, 1902	22 yr.	M	Nevus on right side of face, forehead and nose	.....	Onset at 14 years; jacksonian epilepsy; paresis of left side; no signs of increased cerebral pressure; mentality retarded
5	Naecke: Neurol. Centralbl. **24**: 930, 1905	51 yr.	M	Nevus on left outer angle of upper lip and on left eyelids	.....	Onset at 42 years with insanity and delirium; 9 years later convulsions; later stupor; poor vision of left eye
6	Cushing [9]	8 yr.	M	Nevus over entire right side of face, fifth nerve distribution; few patches on left side	.....	Onset at 9 months with generalized convulsions; latent period of two years; marked mental retardation; right pupil larger than left; generalized convulsions followed by complete left hemiplegia; operation considered inadvisable
7	Brockaert [39]	16 yr.	M	Raised nevus from tip of nose to top of forehead	.....	Onset at 12 years, when growth of tumor was noticed, followed by change in personality and convulsions of jacksonian type; enormous tumor of forehead; severe epistaxis; right hemiplegia; left exophthalmos; continuous systolic blow on auscultation; dilated facial arteries
8	Isenschmid [33] (case 1)	9 yr.	F	Cavernous angioma of face and head, particularly on right side	.....	Onset at 4 years with headache, vomiting and dizziness; jacksonian epilepsy on left side; fleeting hemiparesis on left side; papilledema; heart enlarged to left; bruit over skull; patient improved by operation in which right common carotid artery was tied off
9	Isenschmid [33] (case 2)	36 yr.	M	Marked dilatation and enlargement of arteries of skull	.....	Onset at 24 years with headache and loss of consciousness; at 32 years left spastic hemiplegia and left homonymous hemianopia developed; heart enlarged to left; murmur over cranium

10	Hebold [22] (case 1)....	13 yr.	M	Extensive nevus on left side of head and face, extending to right	.....	Onset at 4 months with epileptic convulsions; latent to 7 years of age; congenital stigmas; tremors; weakness of right side; right hand smaller than left; right leg dragged; Babinski sign on right; also Oppenheim's sign; mental retardation; epileptic attacks, 18 to 19 a day; jacksonian type on right side; turned eyes to right away from lesion; undescended testicles; obesity (cause given as involvement of pituitary gland by tumorous tissue)
11	Hebold [22] (case 2)...	20 yr.	F	Vascular nevus on forehead and over right eye	.....	Hemiparesis on right; tremors of right hand; left pupil larger than right; choreiform movements of right hand; mental retardation; apparently lesion of skin is on side opposite to lesion of the brain
12	Oppenheim [30] case 1)	34 yr.	M	Lesion of left side of upper lip and left cheek	.....	Onset at 33 years with headaches over left frontal area; loss of speech; paralysis of right side
13	Oppenheim [30] (case 2)	10 yr.	M	Nevus on left side of face and on oral mucous membranes on left	.....	Onset at 7 years with twitchings and convulsive seizures; left retina pushed forward slightly; mentality impaired; violent outbursts of temper; exaggerated knee jerk and ankle clonus on right side; author explains discrepancy between side of lesion and side of signs as due to noncrossing of pyramidal tract fibers
14	Cockayne [26]	15 mo.	F	Port-wine stain on scalp, face, arms, leg and trunk, fairly symmetrical, following posterior root distribution	.....	Onset at birth with convulsions; fits on left side at 6 weeks; similar attacks at intervals to 1 year; shaking of left arm; spastic hemiplegia on left side; intelligence good
15	Dimitri [34]	13 yr.	M	Port-wine nevus on left cheek, face and chin	In left parieto-occipital area, ramifications with double contour—most likely ramifying blood vessels	Onset at 3 months with jacksonian convulsions followed by right hemiplegia; latent period of 6 years; retarded mentality at 7 years
16	Mouriquand and Bernheim: Presse méd. **31**: 634, 1923	3 yr.	F	Vast nevus on both sides of face and on left arm	.....	Onset at 7 months with convulsions; spastic hemiplegia on left side
17	Brushfield and Wyatt [27] (case 1)	11 yr.	F	Extensive nevus on right side of scalp, face, ear, right arm, back and legs	.....	Onset at 6 months with convulsions; condition lasted to 3 years of age; patient a total imbecile; spastic hemiplegia on left side
18	Brushfield and Wyatt [27] (case 2)	11 yr.	F	Nevus on both sides of face and scalp	Calcification	Patient an imbecile of low grade; old left hemiplegia; positive Wassermann reaction
19	Brushfield and Wyatt [27] (case 3)	2 yr.	M	Port-wine nevus on face	.....	Congenital right hemiplegia; complete idiocy; fits; contracture deformities
20	Brushfield and Wyatt [27] (case 4)	17 yr.	M	Nevus on right side of face	.....	Onset at 3 years with convulsions; left hemiplegia; imbecility of low grade
21	Marque [44] (case 1)...	10 yr.	F	Nevus over right eye and on upper and lower lids and inner side of nose and on cheek	Tortuous shadow in right occipital lobe	Onset at 7 months with convulsions; generalized epilepsy; paralysis of left side of face; contraction of visual fields; normal intelligence

TABLE 6.—*Summary of Data in Unconfirmed Cases—Continued*

Case	Author	Age	Sex	Lesion of Skin	Roentgen Findings	Comment
22	Marque [44] (case 2)...	9 yr.	F	Nevus over left side of face, neck and nose	Shadow over left occipital lobe	Onset at 4 months with jacksonian convulsions of right side; right hemiplegia; mentally retarded
23	Marque [44] (case 3)...	5 yr.	F	Nevus on left side of face and neck	Negative	Onset at 9 months with jacksonian convulsions of right side; latent period of one year; no paralysis; normal intelligence
24	Marque [44] (case 4)...	13 yr.	?	Port-wine nevus over left side of head	Negative	Jacksonian convulsions of right side
25	Aynsley: Brit. J. Dis. Child. **25**: 197, 1928 (case 1)	9 yr.	F	Nevus of simplex variety, covering entire left side of face and scalp, left arm and left side of chest, present since birth	.....	Onset with petit mal attacks; right hemiplegia; spasticity of right arm and leg; congenital glaucoma of left eye with cupping of optic disk
26	Aynsley: ibid. (case 2)	6 yr.	F	Nevus of simplex and cavernous type present since birth on right side of face and head, including buccal mucous membrane, palate and tongue, ending exactly in midline	.....	Hemihypertrophy of right side of face; right buphthalmos; atrophy and cupping of right disk; jacksonian epilepsy; patient imbecile, does not walk
27	Weber [25]	28 yr.	F	Port-wine nevus on left side of back, limited by midline, in front, an extensive distribution on face, more on left than on right side	Sinuous shadow; sclerosed left cerebral hemisphere, which was opaque, occupying a small part of cranial cavity; calcareous deposits; congenital glaucoma on left	Onset at birth with right hemiplegia; no convulsions; patient slightly defective mentally, obese
28	Rawling, cited by Weber,[25] p. 442	10 yr.	M	Nevus of right side of face	Mass of tortuous vessels on right side of brain; calcification over midbrain in frontal portion	Onset at 6 months with convulsions; jacksonian fits; weakness of left arm; yearly convulsions since; poor mentality; irritability; weakness and spasticity of left side; patient one of twins; received radium treatment
29	Sheldon, cited by Weber,[25] p. 440	67 yr.	M	Hemangioma on left side	Apparent racemose meningeal hemangioma on left side	Paralysis of entire right side; patient imbecile
30	Worcester-Drought, cited by Weber,[25] p. 438	22 yr.	M	Cutaneous hemangioma on right side	Negative	Onset at 18 years with convulsions; convulsions once a month since, mainly in left side of face and left arm; motor weakness of right arm; left knee and ankle jerks brisker than right
31	Worcester-Drought, cited by Weber,[25] p. 438	6 yr.	F	Hemangioma of right side of face and neck	Negative	Onset at 14 days with convulsions; attacks one and two months later; left pupil larger than right; slight nystagmus and deviation of eyes to right; left knee jerk brisker than right
32	Laignel-Lavastine, Delherm and Fouquet [32]	28 yr.	M	Cavernous angioma on left side of face and head since birth	Shadows and calcified areas on left side of brain	Onset during infancy with jacksonian epilepsy; frequent attacks; fleeting paralysis of right side at 14 years; no mental retardation
33	Moore [38]	12 yr.	M	Nevus on left side of face	Calcified hemangioma in	Defective vision of left eye

33	Moore [38]	12 yr.	M	Nevus on left side of face	Calcified hemangioma in occipital area of brain	Defective vision of left eye
34	Vincent and Heuyer [36] (case 1)	4 yr.	M	Vascular nevus on right side of face; also one on trunk	Shadow with tortuosities occupying region of right occipital lobe	Onset at 7 months with convulsions (type not mentioned); occasional attacks of loss of consciousness at 3 years, but no convulsions; 6 months later, convulsive seizures, bilateral, but more marked on left side, from 7 to 10 a day; mental retardation; no paralysis; slight optic atrophy; 2 series of radium treatments followed by improvement
35	Vincent and Heuyer [36] (case 2)	13 yr.	M	Vascular nevus over entire left side of face since birth	Atrophy of left side of brain; mass infiltrating left hemisphere; digitations and tortuosities seen in mass	Onset at 6 weeks with one jacksonian convulsion, followed by right hemiplegia; convulsions continued to 6 years; latent period to 13 years; dysarthria; paralysis and spasticity of right side; increased ankle and knee jerks and Babinski reflex on right side; papilledema; radium therapy
36	Cavel [40]	12 yr.	F	Port-wine nevus in right frontal region	Calcified shadow with double contour in right parietal area	Onset at 5 months with convulsion; one again at 5 years; mental retardation
37	Schaefer [37]	12 mo.	F	Bluish-red hemangioma widespread on left side of face since birth, involving hard palate and buccal mucous membrane on left side; also one on left side of body; lesions flat	Encephalography showed left hemisphere smaller than right and left ventricle smaller than right	Onset at 4 months with jacksonian convulsions; attacks frequent from then on; loss of consciousness of right side; eyes turned to right; weakness of right arm at 5 months; paresis of right leg at 12 months; murmur heard over skull; no mental retardation
38	Yakovlev and Guthrie [5] (case 1)	28 yr.	F	Port-wine nevus over right side of forehead, eyebrow, upper lip and side of nose following distribution of ophthalmic branch of fifth nerve	Whirl of calcified blood vessels in right frontoparietal region	Onset at birth with paralysis of left side; jacksonian convulsions of left side at 2 months; exaggerated reflexes on left side; speech difficulty; mental retardation
39	Yakovlev and Guthrie [5] (case 2)	30 yr.	M	Port-wine nevus on left side of forehead since birth in area of distribution of first and second divisions of left trigeminal nerve	.....	Onset at 9 months with paralysis of right arm and leg; after that, convulsions once a week; later, general status epilepticus and advanced dementia; Weber's syndrome—hemiplegia alternans abducento facialis (due to pontile hemorrhage?); protrusion of left eyeball; hypertrophy of left side of face; optic atrophy on left; mental retardation
40	Yakovlev and Guthrie [5] (case 3)	25 yr.	F	Port-wine nevus on right side of forehead and nose and right cheek since birth	.....	Onset at 9 years with fits; other attacks since; no paralysis; generalized muscular rigidity; right eye larger than left; retinal vessels increased in number and turgescent; mental retardation
41	Yakovlev and Guthrie [5] (case 4)	9 yr.	M	Port-wine mark on right side of face since birth, following distribution of first and second divisions of right fifth nerve	.....	Onset at 6 months with convulsions; paralysis of left side at 8 months; contractures later; marked mental retardation
42	Yakovlev and Guthrie [5] (case 5)	43 yr.	F	Vascular nevus on right side of brow and upper lid	Whirl of calcified blood vessels in right occipital region	Generalized muscular rigidity; no paralysis; mental deterioration

TABLE 6.—*Summary of Data in Unconfirmed Cases—Continued*

Case	Author	Age	Sex	Lesion of Skin	Roentgen Findings	Comment
43	Brock and Dyke [10] (case 1)	6 yr.	M	Port-wine nevus on right side of forehead, scalp and upper lip since birth, following distribution of first and second branches of right trigeminal nerve	Fine foci of calcification in right occipital region, with convoluted appearance; porencephalic cyst on left	Onset at 9 months with convulsions; left extremities flaccid; head and eyes turned to right; later both eyes turned to left and right hemiplegia found (hemorrhage?); 2 years later patient could neither see nor hear; amentia
44	Brock and Dyke [10] (case 2)	16 yr.	M	Arteriovenous angioma in frontal region of scalp since 4 years of age; telangiectasis of left side of face since birth	Calcification	Marked bruit over lesion of skin; right homonymous hemianopia; bruit over intracranial lesion; enlargement of heart; tachycardia; unusual cardiac murmurs; slight paralysis of right side of face; mental retardation; roentgen treatment, without benefit
45	Ellis: Proc. Roy. Soc. **25**: 1732, 1932	9 yr.	M	Extensive nevus on right side of face, covering area supplied by ophthalmic branch of fifth nerve	2 racemose areas of calcification: lower one below tentorium cerebelli on right; upper one in region of posterior portion of right parietal bone	Onset at 7 months with jacksonian fits; left hemiparesis; left external strabismus; mental retardation
46	Rocke: Proc. Roy. Soc. Med. **25**: 793, 1932	11 mo.	M	Port-wine nevus over head, forehead and neck; widest distribution on left side	.....	Onset at 3 months with jacksonian convulsions of left side; recurrences at subsequent intervals; right eye larger than left; cupping of right disk, suggesting congenital glaucoma
47	Crouzon, Christophe and Gaucher: Rev. neurol. **1**: 361, 1933	18 yr.	M	Port-wine nevus over entire left side of face, following superior and middle branches of trigeminal nerve	Vermicular shadow in occipital region at level of sella turcica	Onset in infancy with general epileptic fits; left pupil irregular and poorly reactive to light; buphthalmos; no paralysis; mental retardation
48	Koessler: Bull.et mém. Soc. de radiol. méd. de France **21**: 671, 1933	5 yr.	?	Port-wine nevus on right side of face	Tortuous vermicular shadow in right occipital lobe	Left hemiplegia; total idiocy

49	Subirana [42] (case 1)	34 yr.	M	Nevus on left side of forehead and eyelid, along ophthalmic branch of fifth nerve	Diffuse shadow in left frontoparietal region	Onset at 31 years with jacksonian epilepsy of right side; weakness of right side; vertigo; mental retardation
50	Subirana [42] (case 2)	12 yr.	F	Enormous nevus covering entire right side of face and extending over to left	Racemose calcification on right side	Onset at 5 years with impairment of speech; jacksonian epilepsy on left and left hemiplegia developed; mental retardation
51	Subirana [42] (case 3)	15 yr.	F	Nevus on right side of face just below lower eyelid	Markedly increased vascularization in left parietal region	Onset at 14 years with jacksonian epilepsy on left side; left hemiparesis; urinary incontinence; author believes syndrome not so rare as generally believed
52	Krabbe [41] (case 1)...	24 yr.	M	Angioma of right side of forehead	Sinuous shadow, size of egg, in left occipital lobe; still present after 8 years, same size	Onset at 2 years with epileptic seizures; latent for 14 years; past and family history negative
53	Krabbe [41] (case 2)...	26 yr.	F	Large nevus, size of hand, on right side of forehead	Sinuous shadow in right occipital lobe	Onset at 3 years with general epileptiform convulsions accompanied by loss of consciousness; mentality clear
54	Krabbe [41] (case 3)...	12 yr.	M	Large vascular nevus, size of hand, on left side of forehead and left eyelid	Shadow in left occipital area	Onset at 2½ months with convulsions for 3 days; latent period for 1 year; then fits; right pupil larger than left; mental retardation; patient obese
55	Krabbe [41] (case 4)...	11 yr.	F	Angioma of right side of face and head	Gyrate shadow in right occipital lobe	Onset at 1 year with repeated convulsions; imbecility; radium treatment for cutaneous lesions for 6 years
56	Van Westrienen: Maandschr. v. kindergeneesk. **3**: 242, 1934	6 yr.	M	Port-wine nevus on both sides of face with trigeminal distribution	Calcified areas in right side side of cerebrum	Epilepsy, generalized; frequent paralysis of left side of face; mental retardation
57	Williams [28] (case 1)	20 yr.	F	Extensive port-wine stain confined to right side of face, thorax and leg	Extensive calcified cerebromeningeal hemangioma extending from frontal to occipital region on right	Onset at birth with fits; left hemiplegia of infantile type; left homonymous hemianopia; mental deficiency
58	Williams [28] (case 2)	27 yr.	F	Port-wine stain on left side of face, confined to area supplied by first and second divisions of trigeminal nerve	Calcified cerebromeningeal hemangioma in left occipital region	Onset at birth with generalized epilepsy; slight weakness of right facial muscles; mental deficiency (high grade)

TABLE 7.—*Summary of Data in Confirmed Cases*

Case	Author	Age	Sex	Lesion of Brain	Lesion of Skin	Roentgen Findings	Operation	Observations Confirmed by	Comment
1	Kalischer [2]	1½ yr.	?	Left cerebral hemisphere small and covered by diffuse meningeal angioma; dura mater adherent to skull on left; left side of frontal bone thickened	Capillary nevus on left side of face; flat nevus	.....	.....	Necropsy	Onset at 6 months of age with jacksonian convulsions; death due to bronchopneumonia following pertussis
2	Strominger (cited by Cushing [9]	.....	..	Lesion of left side with angioma of meninges	Extensive nevus on left side	.....	.....	Necropsy	Right hemiplegia, spastic; death due to an intercurrent infection
3	Cushing [9]	5 yr.	M	Nevus of dura over motor cortex; many adhesions with overlined leptomeninges	Port-wine nevus limited to ophthalmic divison of right trigeminal nerve	.....	Preoperative ligation of external carotid artery; at operation, adhesions between cortex and meninges freed	Operation	Onset at 10 months of age with generalized convulsions; normal mentality; right buphthalmos; patient benefited by operation
4	Cushing [9]	4 yr.	M	Cranial bones and meninges on right very vascular; right cerebral hemisphere smaller than left; adhesions between cortex and dura on right; gasserion ganglion on right very small and only small amount of fibrous tissue in Meckel's cavity	Nevus on right side of face over entire distribution of fifth nerve; also on left side over entire mandibular area; patch on right buttock	.....	Attempt to turn bone flap down unsuccessful because of extreme vascularity	Necropsy	Onset at 13 months of age with jacksonian convulsions of left side; latent period for 1 year; mentality good; right buphthalmos; death of erysipelas after operation
5	Volland [23] (case 2)..	26 yr.	F	Large cavernous angioma in each frontal lobe; no calcification	Nevus removed from left forearm in early childhood	.....	.....	Necropsy	Onset at 3 years with hemiplegia; many epileptic attacks since age of 12; mental deterioration
6	Volland [23] (case 1)..	6 yr.	M	Skull bones on left thicker; left hemisphere smaller than right; pia on left side thickened and cloudy, containing tremendous number of tortuous blood vessels which gave it bluish-red appearance; this involved frontal lobe and extended back to occipital lobe; microscopic deposits of lime salts particularly occipital lobe, replaced brain tissue; walls of many vessels completely calcified	Telangiectasis of left side of face and forehead, extending slightly to right side of forehead	.....	....	Necropsy	Onset during neonatal period with jacksonian convulsions entire right side; latent period of 9 months; mental retardation; right hemiplegia

7	Hebold [22]	32 yr.	M	Hypoplasia with microgyria of right hemisphere; pia on right side thickened; calcification and pigmentation	Nevus on right side of face	.....	.....	Necropsy	Onset at 7 months of age with paresis and contractures of left side; latent period for 1½ years; epileptiform attacks with residual weakness of left hand and foot; slight mental retardation
8	Hebold [22]	23 yr.	M	Hemangioma of pia on left and hypoplasia of left hemisphere	Nevus on left side of face and neck	.....	.....	Necropsy	Onset at 5 years with jacksonian spasms; paralysis of right side; frequent attacks (20 a day); mentality distinctly impaired (could not read or write); death due to pulmonary lesion
9	Hebold [22]	28 yr.	F	Bone and dura thickened; pia cloudy; hypoplasia of right cerebrum, with calcium deposits	Nevus of entire face and and back of thorax	.....	....	Necropsy	Onset at 3 years with convulsion following questionable attack of meningitis; complete idiocy; paralysis and contractures of left side; epilepsy; death due to pulmonary lesion
10	Sachs [8]	10 yr.	M	Angiomatous process over dura, connected with pial vessels	Pale telangiectasis over right side of forehead	Calcification	Ligation of vessels	Operation	Onset at 3 months of age with jacksonian convulsions; choroidal atrophy of left fundus; patient free from symptoms for 15 years after operation
11	Spiller [6]	12 yr.	M	Meningeal vessels 3 to 4 times normal size; bluish discoloration of brain; tremendous venous channel under dura mater	Telangiectasis over left eye and over left side of scalp since birth	.....	.....	Operation	Onset at 3 months with paralysis of right arm; paralysis of right leg at 1 year and later of face; first convulsion (not jacksonian) at 12 years; mental retardation; mother exposed to roentgen rays at third month of pregnancy
12	Hugo [31]	7 yr.	F	In all ventricles of brain vascular tumors ranging in size from that of pinhead to that of pea	Extensive cavernous hemangioma over whole right side of neck and upper and lower lips	.....	.....	Necropsy	Severe epileptic seizures (type not mentioned;) paralysis of left arm and leg; patient an idiot with dirty and destructive habits; inarticulate, unable to walk
13	Kohnstam, cited by Weber [25]	45 yr.	M	Racemose arterial angioma of leptomeninges over middle of motor cortex on right side of brain	Nevi of lower lip	.....	.....	Operation	Jacksonian epilepsy, beginning in left hand, 3 years before operation; patient benefited by local extradural insertion of radium
14	Kufs [20] (case 2).....	44 yr.	F	.....	Multiple small cavernous nevi of face and thorax	.....	....	Necropsy	Onset at 17 years; paralysis of right side; paresthesia; double vision; nystagmus; papillitis; elevation of temperature for several weeks; (for father's condition see case 1 of Kufs)

TABLE 7.—*Summary of Data in Confirmed Cases—Continued*

Case	Author	Age	Sex	Lesion of Brain	Lesion of Skin	Roentgen Findings	Operation	Observations Confirmed by	Comment
15	Kufs [20] (case 1).....	?	M	Cavernous angiomas on cortex of both hemispheres	Nevus on forehead, both cheeks and back	.....	.....	Necropsy	Mental symptoms; excessive cruelty to family; (for condition of daughter of this patient see Kufs' case 2)
16	Vincent, cited by Weber [25]	16 yr.	F	Extensive local hemangiectasis of pia arachnoid over convexities of left cerebral hemisphere	Facial hemangioma of right side	.....	.....	Necropsy	General epileptic convulsions; imbecility; no hemiplegia; death due to tuberculous meningitis
17	Holmes: Brain **54**: 470, 1931	32 yr.	F	Densely packed mass of vessels on lateral aspect of occipital lobe	Port-wine nevus on right cheek	Negative	Osteoplastic flap made in right parieto-occipital area; because of extreme intracranial pressure and patient's poor condition, further procedure was abandoned; death occurred after few hours	Operation and necropsy	Onset at 31 years with headaches; blowing sound on right side of head; dimness of vision; no mental retardation; nystagmus; left pupil larger than right; knee jerks more active on left; hemangioma on right
18	Stewart [24]	17 yr.	F	Pial vessels congested and thickened; left hemisphere smaller than right; marked deposits of calcium in gray matter of left cortex	Port-wine nevus over greater part of left side of face and scalp, on left scapular region and on both legs	.....	.....	Necropsy	Jacksonian epilepsy; marked mental retardation; spastic hemiplegia on right
19	Yakovlev and Guthrie [5]	40 yr.	M	Left cerebral hemisphere much smaller than right; pial vessels thick and tortuous, showing distinct increase in size and number; calcification of pial and cerebral blood vessels (also angioma of right lung; perforation of colon resembling angiomatosis, due to postthrombotic gangrene with hemorrhage)	Port-wine nevus on upper part of face and forehead, on both sides, spreading over scalp; trigeminal distribution	.....	.....	Necropsy	Previous to admission to insane asylum at age of 14, patient had series of convulsions and right hemiplegia; further mental and physical deterioration followed; from 3 to 15 seizures a month; exophthalmos

20	Brock and Dyke [10]	21 yr.	M	Flat reddish angiomatous mass at right cavernous sinus, extending to and covering the right part of the optic chiasm; a venous angioma (a bruit in the temporal region showed that an arterial component entered into the formation of the vascular lesion)	Large angioma on right side of face	Two unusually large vascular channels in right frontal bone; no calcification	.....	Necropsy	Exophthalmos; blindness of right eye; ocular palsies; weakness of left side of face; cerebellar signs; mental deterioration; venous angioma of right retina; loud systolic bruit over right temporal region
21	Rogers [7]	7 yr.	M	Extensive extradural and intradural plexiform arteriovenous anastomosis	Port-wine stain over right side of face and forehead	Opacity in right frontoparietal area	Ligation of angiomatous mass and tying off of right internal carotid artery 2 months later	Operation	Onset at birth with fits; condition improved by operation—only one or two fits during first year after operation
22	Della Torre: Riv. di neurol. **7**: 281, 1934	12 yr.	M	Thickened dura with prominent dilated blood vessels; also a pulsating mass of blood vessels	Port-wine nevus on left side of face following distribution of upper 2 brances of trigeminal nerve; nasal mucosa on left involved	A vermicular shadow in left parietooccipital lobe	Ligation of most prominent vessels with ligatures and Cushing's clips	Operation	Onset at 5 years with generalized epileptic seizures; aura of visual hallucinations preceded convulsions; developed clonic convulsions of left side immediately after operation; condition subsequently improved
23	Krabbe [41]	27 yr.	M	Calcification of outer layers of cortex; angioma of pia; aplasia of brain with secondary sclerosis	Large nevus on right cheek and forehead	Irregular shadow in right occipital lobe	.....	Necropsy	Onset during infancy with one convulsion; at 8 years, petit mal attacks, generalized with loss of consciousness; obesity; left pupil larger than right; death due to hemorrhagic nephritis
24	Greenwald and Koota: Am. J. Child. Dis. **51**: 868, 1936 (this issue)	5 yr.	M	Pulsating vascular structure, occupying cortex; mass was under dura and seemed composed of many small tortuous vessels and a few larger veins	Faint vascular lesion on left ear, extending on to scalp; also present on left side of trunk, left arm and upper part of left thigh	Negative	Subparietal decompression	Operation	Onset at 5 years with paresis, followed three days later by jacksonian epilepsy involving entire right side; previous history of intestinal bleeding; improvement after operation

Treatment with radium has given favorable results in the hands of Vincent and Heuyer,[36] Kohnstam[46] and Marque,[44] as well as in our hands. Dyke[47] expressed the belief that roentgen therapy is of considerable aid in the treatment of the venous angiomas; in 2 of his patients the number and the severity of the convulsive attacks were greatly lessened after several series of roentgen treatments. It is of interest to note that the patients who responded were those with venous angiomas. The same method was employed in treating the angiomas as in treating tumors of other types except that the dose at each treatment was decreased to one fourth or one fifth of an erythema dose. The treatments were given about once a week.

At times, the best results may be obtained by a combination of surgical operation and radiotherapy, as in the cases of Magnus,[48] Marque[44] and Kohnstam[46] and in our case. In all these cases decompression was followed by radiotherapy. In Magnus' patient the symptoms completely disappeared following this treatment. Decided improvement followed in our case also, but it is much too soon to speak of permanent or even prolonged benefit. Finally, we wish to state that, in evaluating any method of treatment, the long latent period characteristic of this disease should be taken into consideration. Death is not always due to the lesion in the brain. In 7 of the 24 confirmed cases in which the causes of death were definitely stated, such conditions as pulmonary infections, tuberculous meningitis, nephritis and erysipelas, not angioma, were responsible for the death of the patients.

SUMMARY

A case of hemangioma of the brain associated with a nevus of the skin in a boy 5 years old is reported. Eighty-one additional reported instances have been collected and analyzed.

Symptoms characteristic of this disease and present in almost every case, in the order of their importance, are: (1) convulsive seizures which in the majority of cases have been jacksonian; (2) hemiplegia; (3) mental retardation, and (4) nevus of the skin. Other important signs and symptoms result from ocular changes.

In every case of so-called idiopathic epilepsy a careful search should be made for a nevus about the face, head or neck. If present, cerebral hemangioma should be suspected and roentgenologic studies of the skull should be made for further confirmation.

Operative intervention combined with radiotherapy is indicated.

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46. Kohnstam, cited by Weber.[25]

47. Dyke, C.: The Roentgen Ray Treatment of Tumors of the Brain and Skull, Bull. New York Acad. Med. **11**:392, 1935.

48. Magnus, cited by Cushing and Bailey.[3]

News and Comment

GENERAL

Physicians Certified by American Board of Pediatrics.—The following physicians have been certified by the American Board of Pediatrics since the last report:

Harry Bakwin, New York; Ruth Morris Bakwin, New York; Granderson Hearn Bradly, Nashville, Tenn.; Floyd S. Clarke, Omaha; Wyman C. C. Cole, Detroit; Harry Hampton Donnally, Washington, D. C.; James Everett Dyson, Des Moines, Iowa; Fred Leib Glascock, Los Angeles; Alton Goldbloom, Montreal, Canada; Philip C. Jeans, Iowa City; Edgar J. Huenekens, Minneapolis; Sigurd Herbert Kraft, Chicago; George Marshall Lyon, Huntington, W. Va.; Katharine Krom Merritt, New York; Walter Roger Moore, St. Joseph, Mo.; Lillian Lydia Nye, St. Paul, Minn.; Martin D. Ott, Davenport, Iowa; Marshall Carleton Pease, New York; Bennett Watson Roberts, Durham, N. C.; Lester Rosenberg, Brooklyn; Roland P. Seitz, San Francisco; Morton Seldowitz, Brooklyn; Warren Richards Sisson, Boston.

None of these was examined.

American Board of Pediatrics.—The examinations of the American Board of Pediatrics will be given in the following cities on the dates stated:

Kansas City, Mo., May 9, preceding the meeting of the American Medical Association and the American Academy of Pediatrics.

Albany, N. Y., June 10, preceding the meeting of the American Pediatric Society.

Baltimore, November 1936, at the time of the joint meeting of Regions I and II of the American Academy of Pediatrics.

Cincinnati, November 1936, at the time of the meeting of Region III of the American Academy of Pediatrics.

San Francisco, October 1936, at the time of the meeting of Region IV of the American Academy of Pediatrics.

Summer Courses on Child Development and Parent Education.—The usual summer courses on child development and parent education will be held at the University of Iowa; the first session will last from June 8 to July 16, the second session, from July 20 to August 20. The tuition for the first course is $36, and that for the second course, $30. Requests for information should be sent to the Summer Session Office, 117 University Hall, Iowa City.

SOCIETY NEWS

International Congress of Pediatrics and International Congress for the Protection of Children.—The International Congress of Pediatrics will be held in Rome during the first week of October 1936. Immediately following this the International Congress for the Protection of Children will be held. The president of the latter is Prof. G. B. Allaria, Corso Bramante 29, Torino, Italy.

Abstracts from Current Literature

Anatomy and Physiology

STUDIES IN THE EMBRYOLOGY AND HISTOLOGY OF THE DUCTLESS GLANDS. GEORGE A. WYETH, M. Rec. **141**:460 (May 15) 1935.

Wyeth discusses the embryology and histology of the parathyroid and thymus glands and gives photographs of sections taken at various ages.

WILLIAMSON, New Orleans.

Pathology, Bacteriology and Biochemistry

SERUM CALCIUM AND INORGANIC PHOSPHORUS DETERMINATION IN 294 CHILDREN. CHARLES G. KERLEY, EDWARD J. LORENZE JR. and EMMA R. GODFREY, Arch. Pediat. **52**:243 (April) 1935.

The authors report the calcium and phosphorus determinations in 294 cases, the diagnoses being ranged as follows:

Neurasthenia	90	Epilepsy	15
Defective teeth	48	Chorea	14
Rickets	35	Idiopathic convulsions	8
Habit tic	28	Asthma	6
Petit mal	17	Colds	3
Tetany	15	Miscellaneous	15

A wide variation from the normal blood serum values of calcium and inorganic phosphorus seems to be required before clinical signs are in evidence. In the 294 cases reported significant symptoms relative to serum values occurred in but 7 patients—a calcium content of 5.45 mg. per hundred cubic centimeters in a child with celiac disease with tetany and convulsions and a calcium content of 4.83 mg. in a girl of 10 years of age with tetany and convulsions. In 5 instances in the rachitic group there was a lowered phosphorus content.

WADDELL JR., University, Va.

EXPERIMENTAL PULMONARY EMBOLISM ASSOCIATED WITH VENOCLYSIS. MERVIN J. RUMOLD, Arch. Surg. **30**:685 (April) 1935.

With the increased popularity of the continuous intravenous injection of drugs and fluids there has been a rise in the incidence of pulmonary embolism. To confirm the opinion of the author that pulmonary complications frequently occur with continuous venoclysis, experiments were carried out on dogs to study the incidence of pulmonary embolism associated with venoclysis. The experiments showed that a foreign body, such as a cannula, lodged in the vein of a dog produces an inflammatory reaction throughout the wall of the vein. All the necessary factors for thrombosis are present; slowing and eddying of the blood current, trauma to the wall of the vessel and eddying of the blood current, trauma to the wall of the vessel and changes in the composition of the blood. In all the animals used in the experiments there was an evident inflammatory reaction of the wall of the vein, with partial occlusion of the lumen by an organizing fragile thrombus. The results of the experiments indicate that a foreign body in a vein is more active in the production of thrombi than is the infused solution. All the dogs showed a higher incidence of pulmonary infarction and thrombosis after having received venoclysis. By analogy it seems probable that pulmonary embolism and

thrombosis are not infrequently associated with continuous venoclysis as used in man, although they may not always be recognizable clinically. The experiments indicate that continuous intravenous infusions are not without danger.

KAISER, Rochester, N. Y.

Nutrition

THE EFFECT OF FEEDING HIGH AMOUNTS OF SOLUBLE IRON AND ALUMINUM SALTS. H. J. DEOBALD and C. A. ELVEHJEM, Am. J. Physiol. **111**:118 (Feb.) 1935.

In day old chicks placed on a normal ration to which was added large amounts of soluble iron or aluminum salts severe rickets developed in from one to two weeks. All the chicks died within three weeks after being placed on the ration. The authors point out that the high doses of iron recommended by many workers in the treatment of secondary anemia may produce untoward results. Such therapeutic doses are equivalent to the highest doses used in the present experiments. This especially applies to the treatment of anemia in children. Precautions against ingestion of a large amount of iron should be taken in the case not only of infants but also of adults, because any change in the diet which reduces the blood phosphorus content to levels reported in this paper surely affects biologic processes in addition to bone formation.

NOURSE, Cleveland.

THE NUTRITIONAL ASPECTS OF MILK PASTEURIZATION. E. V. MCCOLLUM, Am. J. Pub. Health **24**:956 (Sept.) 1934.

"The evidences of animal experiment do not show any differences between raw and pasteurized milk. The actual changes in milk caused by pasteurization are an increase in insoluble calcium of about 6%, a reduction of iodine content by 20%, and considerable destruction of Vitamin C. . . . There is no convincing evidence that raw milk, even if it were safe, is superior to pasteurized milk in infant feeding. . . . The idea of splitting hairs over slight assumed differences is absurd." The author cites various authorities sustaining the view just quoted, and, in addition, he mentions the higher incidence of diphtheria, scarlet fever, intestinal disturbances and tuberculosis for children fed raw milk as compared with that for the children receiving heated milk.

MCBRYDE, Durham, N. C.

FEED THE BABY. HERBERT B. ROTHSCHILD, Arch. Pediat. **52**:64 (Jan.) 1935.

Not abstracted.

PHYSIOLOGICAL EFFECTS OF VITAMIN DEFICIENCIES AS SUMMARIZED BRIEFLY FROM RECENT AND AUTHENTICATED RESEARCH EXPERIMENTS. MILDRED ONCKEN, Illinois M. J. **66**:533 (Dec.) 1934.

During the past year the literary codex of the vitamins had been augmented by more than one thousand authenticated scientific articles. Salient among these, which are mainly corroborations of previous discoveries, is the increasing accumulation of the results of determinations of vitamin distribution in numerous classes of foodstuffs. Among these emphasis is laid on the addition of vitamin D to various food supplies, chiefly milk. Another contribution is the positive identification of vitamin E in the "royal jelly" of the beehive. Concentrated and concrete research suggests that to this sex vitamin, the powerful vitamin E, belongs another potent clinical rôle, that of the predetermination of sex. The young of vitamin E-surfeited mothers are more intelligent and keen than those of mothers deprived of vitamin E to the time when the young are born. In this respect vitamin E exerts an action rivaling that of vitamin B. In the tests performed by the author extracted wheat germ served as the source of vitamin B, and extracted wheat germ oil, as the source of vitamin E.

The effects are similar on the young when, during gestation, the mothers are suffering from depletion of vitamin B and when they are similarly deprived of vitamin E. These effects are more lasting and somewhat more pronounced in the case of vitamin E depletion than in that of vitamin B depletion. Vitamin B has more to do with appetite urge than sex urge, and vitamin E, with sex urge than with appetite urge. A somewhat greater impairment of the "learning" faculty results in the young when the mother is starved of the sex vitamin ration than when she is starved of the appetite vitamin ration. As for infants, practically nothing is known as to their requirements of either vitamin B or vitamin E. It has been established, however, that milk is relatively poor in both these vitamins. For the normal functioning of the brain and of the nervous system vitamin B is recognized as necessary. Probably vitamin E is no less important.

From the first, vitamin E has provoked some question as to the probability of its dual nature, one factor having antisterility potencies and the other serving as a galactogog.

While vitamin A seeks out particularly the visceral tissues in which to accumulate, the musculature and fat are sought selectively by vitamin E. Evans and Burr have found an intimate correlation between muscle weakness and sterility and have demonstrated the cure of both conditions by administration of wheat germ oil. In the ordinary metabolic as well as in the reproductive processes of the body vitamin E is valuable.

Before sterility due to lack of vitamin E is established, there is a predeficiency period when certain symptoms may be manifested. These symptoms include impaired mentality and metabolism and weakened musculature, and they are of the type for which, probably and apparently, only vitamin E can be beneficial.

BARBOUR, Peoria, Ill.

ADEQUATE HYDRATION IN INFANCY. HENRY E. IRISH, Illinois M. J. **67**:143 (Feb.) 1935.

In this article Irish discusses the indications and needs for the use of fluids, the various kinds of fluids and the methods of their administration in acute illnesses in infants.

BARBOUR, Peoria, Ill.

THE PATHOLOGY OF AVITAMINOSIS. HARVEY S. THATCHER, Illinois M. J. **67**: 145 (Feb.) 1935.

After a comprehensive review of the literature on vitamins, Thatcher concludes that it is possible that more vitamins will be discovered when more is known about their exact chemical constituents. He believes that one must turn to the fundamental science of pathology for the identification of these vitamins. The biochemist should work with the pathologist, and the pathologist should cooperate with the physiologist and the anatomist, and this cooperation should continue down the gamut of the fundamental sciences.

BARBOUR, Peoria, Ill.

THE EXCHANGE OF LIPIDS IN THE UMBILICAL CIRCULATION AT BIRTH. E. M. BOYD and K. M. WILSON, J. Clin. Investigation **14**:7 (Jan.) 1935.

Evidence is presented that certain lipids are added to umbilical blood by the placenta and removed or absorbed by the fetus. Tables record the individual values, respectively, for phospholipid, free cholesterol, ester cholesterol and neutral fat obtained from analyses of samples of blood taken from the umbilical vein and artery at birth in fifteen years. Whole blood taken from the umbilical artery contained 22 per cent less phospholipids and 14 per cent less free cholesterol than that from the umbilical vein. The ester cholesterol content was lower in arterial blood only when the venous blood contained over 10 mg. per hundred cubic centimeters of this lipid. Neutral fat was lower in about half the cases and higher in the other half. From the data it was estimated that over 40 Gm. of these substances, 75 per cent of which is phospholipids, is absorbed in twenty-four hours by an average well nourished human fetus at birth.

GUEST, Cincinnati.

VITAMIN G CONTENT OF HOME-CANNED TOMATO JUICE. C. F. POE and E. L. GAMBILL, J. Nutrition **9**:119 (Feb.) 1935.

Workers have denied the presence of vitamin G in tomato juice. In rats fed a diet free from vitamin G the authors produced normal growth by the addition of 4 cc. or more of home-canned tomato juice, and in none of these rats did signs of deficiency develop. The authors believe this result to be due to the presence of vitamin B_2 or G in the tomato juice. In the assay of thirteen samples of the juice a relatively uniform amount of vitamin G was found. The average vitamin content per cubic centimeter was found to be 0.21 unit.

MUNNS, Winnetka, Ill.

THE RELATION OF MANGANESE TO CONGENITAL DEBILITY. A. L. DANIELS and GLADYS J. EVERSON, J. Nutrition **9**:191 (Feb.) 1935.

The results of the experiments indicate that rats born of mothers receiving the milk-copper-iron diet owe their high mortality rate to a manganese deficiency in the mother.

MUNNS, Winnetka, Ill.

THE VITAMIN CONTENT OF SULTANINA (THOMPSON SEEDLESS) GRAPES AND RAISINS. A. F. MORGAN, LOUISE KIMMELL, ANNA FIELD and PAUL NICHOLS, J. Nutrition **9**:369 (March) 1935.

With previously employed technic and the use of rats and pigeons, the authors found that the seedless Thompson grapes depreciate rapidly in vitamin A and B activities when they are preserved by freezing storage. Vitamin B is largely retained in natural sun-dried, soda-dipped raisins, but treatment with sulfur dioxide destroys much of the vitamin. The fresh grapes are rich in vitamin A and retain it in dehydrated form, whether treated with sulfur or not. Drying in the sun seems to destroy much of the vitamin A activity. The fresh grapes have little vitamin C. Freezing reduces the vitamin C content still more, and the raisins have little antiscorbutic value. Inconclusive work indicates that vitamin G is poorly represented in grapes and raisins. All the vitamin A and B activity of fresh grapes appears to be retained in raisins made from Thompson seedless grapes, prepared by the unsulfured, soda-dipped, dehydrating method.

MUNNS, Winnetka, Ill.

THE VITAMIN CONTENT OF FIGS. A. F. MORGAN, ANNA FIELD, LOUISE KIMMELL and PAUL NICHOLS, J. Nutrition **9**:383 (March) 1935.

Although the fresh Kadota and Calimyrna figs preserved in frozen storage were found to contain vitamin C in measurable amounts, no measurable antiscorbutic value was determined for the dried forms. Mission and Adriatic figs contain but little of this vitamin, whether dried or not. The Mission figs are richer in the precursor of vitamin A, which was well retained in the sulfuring process in Mission and Calimyrna figs but not in Adriatic figs. Vitamin B_1 appears to be unfavorably affected by the sulfuring process in all forms of figs, but vitamin G seems to be little affected.

MUNNS, Winnetka, Ill.

VITAMINS IN RELATION TO NORMAL GROWTH AND DENTITION IN CHILDREN. SAMUEL GOLDBERG, M. Rec. **141**:18 (Jan. 2) 1935.

Knowledge of vitamins and their specific functions in the body is of comparatively recent development. Work on these food elements was begun in 1906 by Funk, Hopkins and others, but the results were not published until 1912. The functions of vitamins are first discussed in the paper. Then the author considers each vitamin separately, giving the results of a deficiency on the tissue of the human body.

WILLIAMSON, New Orleans.

Methods of Infant Feeding as Used in the Newborn Clinic, University of Nebraska College of Medicine, the Past Three Years. C. G. Weigand, Nebraska M. J. **19**:451 (Dec.) 1934.

The method used at the clinic consists of the simple dilution of milk, with the addition of sugar, approximately 50 calories a day for each pound (453.59 Gm.) of weight being required. In addition to the diet already mentioned, cod liver oil, orange juice and egg yolk are added to the feeding at the proper age.

Hamilton, Omaha.

Diarrheas in Infants. Andrew G. Dow, Nebraska M. J. **20**:22 (Jan.) 1935.

Diarrhea is often the only sign of a symptom complex resulting from an infection, and a careful search must be made for the etiologic factor. An initial starvation period is instituted, and fluids should be forced by whatever method is necessary. Any drug except opium is of little value. Parenteral infection should receive appropriate treatment.

Hamilton, Omaha.

What Every Person Should Know About Milk. Leslie C. Frank, Pub. Health Rep. **49**:1505 (Dec. 4) 1934.

This article is written for the laity and answers the following questions: (1) Why is milk an excellent food, and how much of it should be included in the diet? (2) How can milk be safeguarded to prevent it from transmitting disease? (3) How can consumers be certain that the milk they drink has been thus safeguarded?

Leslie, Evanston, Ill.

Further Observation on the Evils of Too Much Milk. Eugene Rosamond, South. M. J. **28**:46 (Jan.) 1935.

The author believes that the slogan "a quart a milk a day for every child" is good commercial propaganda but poor medical advice.

Nearly 7 per cent of all ailing children who go to the physician are sick because their mothers are forcing them to take more milk than they need. One-half again as many "muddle through" and do not go to the physician. It is the author's conservative estimate that 10 per cent of the minor ills of childhood are evils of the use of too much milk.

Schlutz, Chicago.

A Note on So-Called Acidosis in Childhood. R. A. Murray Scott, Brit. M. J. **1**:13 (Jan. 5) 1935.

The author's summary and conclusions are as follows: "Twenty-three cases of so-called acidosis have been examined. All have been found to have some nasopharyngeal infection. The results of treating the infection have been uniformly satisfactory in abolishing the 'acidosis.' It is concluded that infection in the nasopharynx is a common cause of recurrent attacks of fever in children."

Royster, University, Va.

Rôle of Vitamin A in Nutrition. Marion B. Richards, Brit. M. J. **1**:99 (Jan. 19) 1935.

It is thought by the author that the terms "growth-promoting" or "anti-infective vitamin" should not be applied to vitamin A but that "antikeratinizing factor" should be used.

In the author's experiment, in the absence of vitamin A growth and attempts to increase in length continue in spite of the decrease in weight, which is probably due to pathologic changes. Attention is drawn to four main points: (1) the early occurrence of pathologic conditions in young rats deprived of vitamin A; (2) the nature of the conditions observed and, in particular, the high incidence of gastro-

intestinal diseases in both young and adult animals; (3) the persistence of the pathologic conditions once they have been established, in spite of subsequent doses of vitamin A, and (4) the parallelism between the observations in rats and those in various reported cases of disease in man.

Experiments on rats showed that when they are fed a diet deficient in vitamin A, pathologic changes occur earlier than has been supposed and well in advance of the recognizable symptoms of xerophthalmia and that xerophthalmia is by no means the most important symptom in vitamin A deficiency. Inflammation of the duodenum and particularly of other parts of the intestinal tract antedates other manifestations. Ulceration of the cecum is a notably early manifestation. Changes occur in the adult rat similar to those already mentioned in the young growing rat. Many of these pathologic conditions persist even after the administration of vitamin A, and generalized infections resulting in the localization of pus in the upper part of the digestive and respiratory tracts suggest that they cannot be cured after they have once been established.

Observations on man show that, so far as the eye is concerned, the lesions are practically identical with those in rats. It is assumed, and the assumption has in part been proved, that similar lesions, as well as generalized infection, occur in man, particularly in the upper part of the digestive tract and in the respiratory tract. Other observers have noted a poor state of nutrition in infants with keratomalacia or bladder stones. The author thinks that it is well to bear in mind the possibility of vitamin A deficiency in various diarrheas or in intestinal disorders.

ROYSTER, University, Va.

OBSERVATION ON RICKETS. WILFRED SHELDON, Lancet **1**:135 (Jan. 19) 1935.

The article consists of a brief review of the clinical, roentgenographic and biochemical findings in rickets.

LANGMANN, New York.

CHRONIC INTESTINAL TOXAEMIA IN CHILDREN. F. N. LE MESSURIER, M. J. Australia **2**:672 (Nov. 24) 1934.

Chronic intestinal toxemia is of frequent occurrence in children and results from excess of carbohydrate in the diet and overfatigue. Children with this condition are poorly developed and appear tired. The appetite is poor, and the tongue is coated. Constipation is the rule, with slimy stools. Abdominal pain is sometimes present. Vasomotor changes may be seen. Fever is continuous or recurrent. Other symptoms are disturbances in sleep, frequent nocturnal enuresis and the general picture of the "nervous child."

Physical signs include enlargement of the abdomen, grossly and microscopically abnormal stools and indicanuria. This condition must be differentiated from "nervousness" in children, appendicitis, pulmonary tuberculosis, tabes mesenterica, tonsillar sepsis, celiac disease and hepatic dyspepsia. An accurate history of the diet is necessary for diagnosis.

Treatment includes a considerable amount of extra rest and avoidance of fatigue, with rest in bed in severe forms. It is necessary to avoid excess carbohydrates and cooked fats and to use only small amounts of "roughage." Only three meals daily should be given. Constipation is best treated with bile and agar preparations. Cod liver oil, malt and iron should be avoided. Change of climate sometimes is beneficial.

GONCE, Madison, Wis.

ALIMENTARY FEVER IN AN INFANT 6 WEEKS OLD. MALDAN-MASSOT, Bull. Soc. de pédiat. de Paris **31**:462 (Nov.) 1933.

A boy, 6 weeks old, had an illness which ran a febrile course for several weeks. It was believed that the condition was alimentary or milk fever, because the temperature resumed the normal level whenever the infant was fed a milk-free mixture. The digestion did not seem to be disturbed, and the stools were normal when the fever was at its height.

BENJAMIN, Montreal, Canada.

SYMPATHETIC OPHTHALMIA PROVOKED BY ULTRAVIOLET RADIATION IN AVITAMINOSIS. A. G. MOURIQUAND, J. ROLLET and M. COURBIÈRES, Compt. rend. Soc. de biol. **118**:1455, 1935.

In experimental avitaminosis A xerophthalmia supervenes at about the forty-fifth day, but with the slit lamp incipient lesions can be noted at about the thirtieth day. Moreover, latent corneal dystrophy is demonstrable a few days earlier by the diminished resistance of the eye to pathogenic agents. A light ultraviolet irradiation of a normal rat's eye causes a superficial burn that heals in from three to four days. In a rat fed a deficiency diet, after the twenty-fourth day, such burns heal indolently and incompletely, and from four to ten days later the eye protected from the radiation begins to show congestive changes.

J. E. LEBENSOHN, Chicago. [ARCH. OPHTH.]

CLINICAL TYPES OF RICKETS. A. B. MARFAN, Nourrisson **23**:1 (Jan.) 1935.

Three types of rickets, based on the age of onset, are described. The first, called rickets of the new-born, begins before the age of 3 months and is characterized by craniotabes and usually by splenic enlargement. Marfan holds that all true craniotabes is rachitic. The second type begins after the fourth month of life, usually between the ages of 6 months and 1 year. Its earmarks are the rachitic rosary, thoracic deformities and epiphyseal swellings of the extremities. It may be accompanied by a moderate grade of anemia. The spleen is usually not enlarged. The third type is the late rickets which comes on at the age of 4 or 5 years. This may be the continuation of earlier rickets, healed rickets that has relapsed or, finally, rickets that has begun after infancy, especially in a child sick with chronic renal disease (the so-called renal rickets) or with some other chronic illness, such as celiac disease. In renal rickets the blood phosphorus content may be normal or increased. It is perhaps in the cases of late rickets associated with other chronic disease that one encounters the most marked bony deformities and dwarfism. After adolescence and the closure of the epiphyses, rickets no longer develops, but in its place one may encounter osteomalacia.

McCLELLAND, Cleveland.

MALNUTRITION AND THE PROGRESS OF MALNUTRITION IN INFANCY. P. NOBÉCOURT, Progrés méd., Jan. 5, 1935, p. 9.

Nobécourt presents the history of a child who at 17 months of age weighed 6 Kg. She was 71 cm. tall, the reduction in structure being only 2.7 per cent, but that in weight 41 per cent, below the normal. The skin was wrinkled, and there was almost total loss of subcutaneous fat; rickets was present. The case is described as an instance of severe undernourishment, which in a younger baby might be called athrepsia. The necessity of an exact estimate of the degree of malnutrition for age and height is emphasized. Also, it is essential to judge whether the malnutrition is progressing, arrested or regressing and to determine and correct the cause.

LESLIE, Evanston, Ill.

BLOOD TRANSFUSION IN THE TREATMENT OF CHOLERA INFANTUM. B. TASSOVATZ and E. SCHNEEGANS, Rev. franç. de pédiat. **10**:599, 1934.

Two cases of severe cholera infantum in young infants are reported, in which all the usual measures seemed of no value. Blood transfusion (200 Gm. per kilogram of body weight) brought about an immediate change for the better, and recovery occurred.

LESLIE, Evanston, Ill.

VALUE OF ROENTGENOGRAPHIC STUDY IN THE DIAGNOSIS OF BARLOW'S DISEASE. ANGELO CHIEFFI, Pediatria **43**:67 (Jan.) 1935.

The author discusses the value of roentgenographic examinations in Barlow's disease and reports a case in a 2 year old child. The symptoms suggested a form of rickets, while the roentgenographic examination pointed out clearly that the true diagnosis was Barlow's disease.

SIGNORELLI, New Orleans.

GUANIDINE CONTENT OF THE BLOOD IN CHILDREN. A. DORDI, Riv. di clin. pediat. **33**:59 (Jan.) 1935.

Using the method of Major and Weber, as modified by Minot and Dodd, the author determined the guanidine content of the blood of ten healthy children and six children suffering from various diseases.

The quantity of guanidine in the blood of normal children seemed independent of the age and varied between 0.12 and 0.2 mg. per hundred cubic centimeters. In two cases of catarrhal jaundice, the content was high, 0.72 and 0.8 mg. per hundred cubic centimeters. In cases of bronchopneumonia the guanidine content of the blood was slightly increased; i. e., 0.4 mg. per hundred cubic centimeters. In other infections there was a tendency to an even smaller increase. No increase over normal values was found in children with congenital heart disease, achondroplasia, mongolism or tetany.

HIGGINS, Boston.

INFLUENCE OF ULTRAVIOLET RADIATION ON THE CONTENT OF VITAMINS A, B AND C OF FRESH COW'S MILK. G. CAREDDU and G. PRETO, Riv. di clin. pediat. **33**:167 (Feb.) 1935.

The content of vitamin C in cow's milk is too small to cure scurvy in guinea-pigs. To prevent the occurrence of scurvy in guinea-pigs from 30 to 40 cc. of milk for each animal a day is necessary. Irradiation of milk in both the presence and the absence of air definitely lowers the vitamin C content.

Irradiation of milk did not seem to affect the vitamin B content; this fact was established by observations that in pigeons fed a diet deficient in vitamin B with the addition of from 30 to 50 cc. of irradiated or nonirradiated milk, neuritic symptoms did not develop.

The vitamin A content of milk is unaffected by irradiation in the absence of air; irradiation in the presence of air rapidly destroys the vitamin, however. Rats were used for the observations on vitamin A.

HIGGINS, Boston.

ADVANTAGES OF PURE MILK IN THE TREATMENT OF EXUDATIVE DIATHESIS. EDUARDO DE CARVALHO, Arch. de pediat., Rio de Janeiro **7**:283 (March) 1935.

The author states that 60 per cent of the sick children whom he sees are suffering from a phase of exudative diathesis. He pleads for the establishment of good dairies from which pure milk can be obtained for these children.

SANFORD, Chicago.

NUTRITIONAL DISTURBANCES OF NERVOUS ORIGIN. EUGENIO CIENFUEGOS, Arch. de pediat., Rio de Janeiro **7**:286 (March) 1935.

The author describes digestive disturbances that arise in children from unrelated causes, such as monotony in hospital feedings, disturbances in respiration and general lowering of morale.

SANFORD, Chicago.

ACID MILKS. J. A. BAUZA and JOSÉ OBER POLLERI, Arch. de pediat. d. Uruguay **6**:49 (Feb.) 1935.

The authors consider milk acidified with lactic acid somewhat inferior to milk containing naturally fermented lactic acid. This is particularly true for infants in the first three months of life.

The authors do not recommend lactic acid milk for infants as a routine but they consider it good for babies whose tolerance has been lowered by parenteral infection, which owing to the high temperature affects unfavorably the chemical activity of the gastro-intestinal tract.

SCHLUTZ, Chicago.

CONSIDERATION OF THE MILK SECRETION BY EXAMINATION OF THE TEMPERATURE OF THE MAMMARY GLAND. JUAN CÓRDOBA, But. Soc. catalana de pediat. **5**: 209, 1932.

Temperature readings were taken with a clinical thermometer in the axilla and under the breast. The differences in the temperature of the two regions varied from 0.3 to 1.6 C. (0.8 to 4.24 F.). When the child obtained sufficient milk the difference was 0.4 C. (1.1 F.) or more. The most frequent differences were between 0.6 and 0.8 C. (1.6 and 2.1 F.).

WATSON, Elmhurst, Ill.

PROGRESS IN ARTIFICIAL FEEDING OF INFANTS. MARTÍNEZ VARGAS, Med. de los niños **36**:17 (Jan.) 1935.

The progress in the feeding of infants is reviewed, and the merits of condensed and powdered milk are discussed. The importance of the vitamins is considered in detail.

DWYER, Kansas City, Mo.

FAT AS A GENETIC FACTOR IN THE NUTRITIONAL DISTURBANCES OF THE NURSLING. D. ENRIQUE SUÑER, Pediatría españ. **23**:361 (Nov.) 1934.

In the organism of the breast-fed infant, fat can produce two unfavorable effects. If fat is present in excess, it can delay the emptying time of the stomach and influence to a considerable extent the intestinal flora. The other unfavorable effect is indirect. If fats are present in inadequate amount, the hydrostability of the cell declines, and the defensive mechanism of cells against infections is greatly diminished.

SCHLUTZ, Chicago.

LACTIC ACID MILKS IN INFANT NUTRITION. CALAZANS LUZ, ODILON DE ANDRADE FILHO and PAULO OSORIO, Rev. de gynec. e d'obst. **27**:652 (Dec.) 1934.

The authors include in this classification all the proprietary forms as well as the usual Marriot acid milk. They recommend lactic acid milk for all premature infants and those with dystrophies, dyspepsias, habitual vomiting and intoxications.

SANFORD, Chicago.

REMOVAL OF LEAD AND COPPER FROM DRINKING WATER. K. HÖLL, Arch. f. Hyg. **113**:296 (Feb.) 1935.

The presence of lead in drinking water is always dangerous to health, owing to its tendency to accumulate in the body and produce toxic effects after long intervals. Little is known regarding the effect on health of copper in the drinking water. However, even a minute amount of copper gives water a metallic taste, and its presence in water used for washing clothes may give rise to objectionable precipitates. The author states that cotton and paper filters absorb lead from water. Charcoal also absorbs lead satisfactorily, and by this means large amounts of water can be filtered in a short time. The Berkefeld filter also holds back lead. Filter-paper containing magnesium oxide is especially useful in filtering lead and copper. The construction of a simple filter is described.

GLASER, Rochester, N. Y.

DISTURBANCES IN EMPTYING OF THE STOMACH IN CHILDHOOD. ELEMÉR HAINISS, Arch. f. Kinderh. **104**:71, 1935.

In studying the emptying time of the stomach in children it was observed that in healthy children who ate heartily the stomach was almost emptied in from two to two and one-half hours. However, in children with poor appetite the stomach

was frequently dilated, hypotonic and still filled with a great deal of food from two to three hours after eating. Three measures are suggested in the feeding and care of children with poor appetite: first, a diet high in carbohydrates and low in fats and the addition of protein to aid in more rapid evacuation; second, lengthening the interval between meals to five or six hours to allow complete emptying of the stomach before the next meal, and, third, the use of measures to increase the tonus of the gastric musculature, such as hot applications to the abdomen, rest, quinine, strychnine, wine and thyroid tablets.

LeMaster, Evanston, Ill.

Specific Prophylaxis and Therapy in Summer Diarrhea. S. J. Schaferstein, Jahrb. f. Kinderh. **144**:24, 1935.

Because of the conflicting reports regarding the use of bacteriophage in dysentery, it was decided to investigate its efficiency in cases of active disease and in prophylaxis, either alone or in combination with a vaccine.

Oral administration of polyvalent dysentery bacteriophage had no favorable therapeutic effect in the series studied.

As a prophylactic measure against summer diarrhea it had no demonstrable effect when used alone or in combination with dysentery vaccine.

Dysentery vaccine (polyvalent), when used prophylactically, did not lower the morbidity rate in the group of vaccinated patients as compared with that in the group of controls.

Landau, Rochester, N. Y.

Influence of Antirachitic Therapy on the Electrocardiogram of the Child. Wolfgang Uhse, Jahrb. f. Kinderh. **144**:63, 1935.

The literature dealing with the experimental and clinical use of the more potent antirachitic substances, such as viosterol, is reviewed.

The author's experimental work consisted in administration of the following preparations to different groups of infants: irradiated milk, viosterol with cod liver oil and cod liver oil. Irradiation with sunlight was also employed in one group.

It was found that ultraviolet irradiation had no effect on the electrocardiogram.

The predominating sign of the influence of viosterol or pure vitamin D is lengthening of the ST interval. It can, besides, produce rounding and thickening of the normal sharp S curve. Frequently, under the influence of viosterol there may be widening or splitting of the T wave.

Changes in the electrocardiogram may be demonstrated with the use of small doses of these antirachitic substances. Similar cardiac changes may be brought about by infections, such as pertussis and bronchitis. These changes are transitory, in contrast to those following the administration of viosterol, which may be present from six to nine months later.

Changes in the electrocardiogram may be demonstrable from four to five weeks after the beginning of treatment.

Rachitic children tolerate viosterol much better than nonrachitic children.

Landau, Rochester, N. Y.

Diminution of Blood Volume in Infantile Intoxication. H. Seckel, Jahrb. f. Kinderh. **144**:80, 1935.

The average values for blood volume—50 cc. per kilogram for the circulating plasma, 32 cc. per kilogram for cell volume and 82 cc. per kilogram for circulating blood—are greatly diminished during intoxication. Part of the diminution in the amount of the circulating blood is due to thickening of the blood through loss of water and part to disturbance in the partition of the blood in the circulatory system. Part of the organs, including the heart muscle and, probably, the muscles of the body, the skin and the related veins, are drained of blood; others, including

the gastro-intestinal tract, liver and spleen are overfilled with stagnant blood. When the circulatory system is thus disturbed, the heart pumps itself empty. This accounts for the roentgenographic picture characteristic of the condition. Illustrations accompanying the article show variations in the size of the heart. They show enormous diminution in the size and the transparency and fuzziness of the shadows of the heart and adjacent blood vessels, the enlargement of the pulmonary fields and the dropping of the diaphragm during the intoxication in contrast to the bright, sharply demarcated shadow of the heart and blood vessels, the normal pulmonary fields and the high position of the diaphragm after recovery from the disturbance.

LANDAU, Rochester, N. Y.

Prenatal Conditions

MULTIPLE DEFORMITIES IN ONE FAMILY. B. D. KNOBLAUCH, South African M. J. **9**:277 (April 27) 1935.

Knoblauch records the occurrence of congenital deformity of the legs (vestigial legs) in three children of different ages in one family. There was no history of congenital deformities in the ancestors on either side. The father and mother were second cousins.

GONCE, Madison, Wis.

CARDIAC MALFORMATION WITH PERMANENT SLOW PULSE RATE AS A RESULT OF AURICULOVENTRICULAR DISSOCIATION. PAUL GIRAUD, P. BUISSON and ASTESIANO, Bull. Soc. de pédiat. de Paris **32**:555 (NOV.) 1934.

A girl, 3 years old, showed a slow pulse rate (48 beats per minute). Under the influence of atropine it increased to 50, and after vigorous exercise it was only 52. The apex impulse was in the fifth interspace in the nipple line. There was a harsh systolic murmur, the maximum intensity of which was heard over the middle of the heart. The tuberculin reaction was positive; the child had been in contact with her father, who had pulmonary tuberculosis. The liver extended to 2 finger-breadths below the costal margin. Roentgenologic examination showed the heart to be somewhat globular, and there was some prominence of the right auricle. At 4 years of age she was seen again after she had recovered from typhoid fever; her pulse rate was then 44, and the cardiac signs were unchanged. She was examined again at 14 years of age; her development and nutrition were very good. Her pulse rate was 50. The systolic murmur was softer, and there was perhaps a faint diastolic murmur along the left border of the sternum. Roentgenologically, the heart was practically normal, and the electrocardiogram was normal except for a poorly defined S wave in lead I and a complete auriculoventricular dissociation, the auricular rate being 86, and the ventricular, 49, per minute. The anatomic lesion is presumed to be an interventricular septal defect with a defect of the bundle of His at the site of the septal perforation.

BENJAMIN, Montreal, Canada.

RARE CONGENITAL MALFORMATION OF THE ESOPHAGUS. CARLOS F. DE ABREU, Arch. de pediat., Rio de Janeiro **7**:163 (Jan.) 1935.

There was atresia of the esophagus, with a fistula that communicated with the trachea, which again communicated with the stomach. Therefore the presence of gas in the stomach made the diagnosis difficult until the roentgenogram disclosed the anomaly. A discussion of the embryologic considerations involved is given.

SANFORD, Chicago.

CONGENITAL DEBILITY. PEDRO DE ALCANTARA, J. de pediat., Rio de Janeiro **2**:103 (March) 1935.

The author considers the factors influencing debility to be hereditary transmission of debilitating characteristics, incorrect intra-uterine development, as from toxemias and infections, early interruption of pregnancy and obstetric traumatism.

SANFORD, Chicago.

A CASE OF THE ADIPOSOGENITAL SYNDROME WITH MULTIPLE MALFORMATIONS. ANTONIO GALDÓ VILLEGAS, Med. de los niños **36**:33 (Feb.) 1935.

An infant presenting deformity of the head, cyanosis, marked apathy, supernumerary fingers and toes and underdevelopment of the genitals is described. The eyes were small and oblique, and the baby was very obese. This boy was the third child of healthy parents, the other two children being normal. He lived only thirty hours. The author describes the condition as the Laurence-Biedl syndrome and reviews the literature on this condition.

DWYER, Kansas City, Mo.

QUANTITY OF AMINO-ACIDS AND OF IRON IN THE PLACENTA. VILÉM LAUFBERGER, Bratisl. lekár. listy **15**:325 (March) 1935.

The importance of knowing the quantitative composition of the nutritive fluids exchanged between mother and fetus led the author to investigate this question by crushing a number of placentas with the contained blood and estimating the different amino-acids after precipitating out the proteins. The following values were found: tryptophan, 2.37 mg. per hundred grams of placenta with its blood; arginine, 1.83 mg.; tyrosine, 5.26 mg.; cystine, 6.51 mg.; histidine, 13.06 mg. The average amount of nonprotein nitrogen was approximately 100 mg. per hundred grams. The excess of histidine agrees with the findings of Madame Kapellar-Adler, whose pregnancy test depends on the determination of the histidine in the urine. The iron content was ascertained in a second series of examinations. This iron is not derived from the hemoglobin or from the protein in such a way that the author could estimate the iron supplied by the maternal body to form the iron and hemoglobin of the fetus. The proportion of total iron to transmitted iron was 20:16 mg. per hundred grams of placenta in one instance and 22:20 mg. in another instance.

VINTON, Brooklyn.

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SUBCUTANEOUS ADIPONECROSIS IN THE NEW-BORN. JIRI ZIMÁK, Bratisl. lekár. listy **15**:617 (March) 1935.

The child was the first-born of a woman of 37 years and weighed 4,600 Gm. Birth was difficult and accomplished with forceps. Respiration was effected after a cold plunge and spanking of the back and buttocks. On the third day blisters, single and diffuse, with induration and erosion of the skin of the buttocks, thighs, shoulders, upper part of the arms and forearms appeared in succession. The initial reddening was so intense as to suggest phlegmon or erysipelas. Resolution followed but left numerous infiltrations. Puncture gave exit to a scanty oily sterile fluid containing neutral fat, fatty acids, cholesterol, carbon hydrate, albuminous substances and products of decomposition. The child's condition was rendered serious by the traumatism incurred at birth and the fever consequent on infection of the upper respiratory passages. It died of bronchopneumonia on the twenty-fourth day, no considerable regression of the infiltrations having occurred and only the inflammation having diminished somewhat. Histologic examination was not possible.

VINTON, Brooklyn.

HISTOLOGIC INVESTIGATION OF THE HEART MUSCLE OF THE HUMAN FETUS. KAZUO MATSUDA and SHINOBU ODANI, Jap. J. Obst. & Gynec. **18**:25 (Feb.) 1935.

The authors studied hearts from thirty fetuses ranging in age from 2 to 10 months. With the fifth month the cells lose their alveolar appearance, become a definite syncytium and show the gradual development of myofibrils and myoplasm. The cells and nuclei of the auricle cannot be distinguished from those of the ventricle. Connective tissue fibers appear in the muscle bundles and around the blood vessels. Lymph spaces and blood vessels are present from the fourth month.

ADAIR and POTTER, Chicago.

Diseases of the New-Born

THE VAN DEN BERGH REACTION (RING TEST) TECHNIC AND HEMOGLOBIN-BILIRUBIN INTERRELATION IN ICTERUS NEONATORUM. NORMAN W. ELTON, J. Lab. & Clin. Med. **20**:817 (May) 1935.

In a study of twenty-four full term infants Elton has concluded that icterus neonatorum is not the result of blood destruction but that it is due to partial anoxemia caused by patency of the ductus arteriosus and to a disturbance of liver function caused by patency of the ductus venosus Arantii.

McMURRAY, Galveston, Texas.

STAPHYLOCOCCAL PNEUMONIA AMONG INFANTS IN A MATERNITY HOSPITAL. C. M. SMITH, Lancet **1**:1204 (May 25) 1935.

Within a period of four days four infants died of pneumonia, one in a maternity hospital in Glasgow and the other three shortly after discharge from the hospital. In the two instances in which a postmortem examination was performed death was proved to be due to Staphylococcus aureus-pneumoniae. Six other infants who were in isolation for a slight nasal discharge on nasal culture showed profuse growth of Staphylococcus in all the cases, and among fifteen infants not in isolation Staphylococcus aureus was recovered from cultures of either the nose or the throat in all but three cases.

Within the previous fortnight an infant had died of a phlegmonous abscess; three mothers and an infant had suffered from suppurative mastitis, and there had been an unusual prevalence of minor septic cutaneous lesions among the infants, followed by a number of cases of mild catarrh of the upper respiratory tract. The spread of the disease was possibly facilitated by the nature of the temporary sleeping arrangements provided for the infants.

LANGMANN, New York.

RUPTURE OF AN ARTERY OF THE UMBILICAL CORD AT THE BEGINNING OF LABOR. H. PAUCOT, Bull. Soc. d'obst. et de gynéc. **24**:202 (March) 1935.

The mother of the infant was a primipara, 34 years of age. The membranes ruptured twenty minutes after the first labor pains were felt. The amniotic fluid was stained with meconium and colored brownish red. An hour after the onset of labor the head was deeply engaged in the left occipito-anterior position, but there was little dilatation. The fetal heart tones were 140 and were not accelerated but weak. As the uterine contractions became weaker and it appeared that spontaneous delivery would not occur, a vaginal cesarean section was made. The infant was cyanotic at birth and weighed 3,450 Gm.; it was easily revived. The cord was observed bleeding 10 cm. from its umbilical insertion, owing to a transverse tear of one of the arteries. The cord was slender and deficient in mucoid substance. The placenta had a low insertion, weighed 680 Gm. and appeared normal. The author states that a tear of the umbilical artery at the beginning of labor is extremely rare. Unfortunately, histologic examination of the cord in this case was not made.

GLASER, Rochester, N. Y.

CEREBRAL TYPE OF BUHL'S DISEASE. H. SLOBOZIANU, Nourrisson **23**:145 (May) 1935.

Three cases of this condition are reported in which there were symptoms pointing to involvement of the central nervous system. Cerebral hemorrhage was suspected in each infant. All died within a few days after birth, and all showed the fatty degeneration and hemorrhages characteristic of Buhl's disease, with absence of intracranial pathologic changes. A toxic form of encephalitis is offered in explanation of the symptoms exhibited. McCLELLAND, Cleveland.

INTRACRANIAL HEMORRHAGE OF THE NEW-BORN. T. VALLEDOR, Bol. Soc. cubana de pediat. **7**:131 (April-May) 1935.

The treatment of this condition is medical and surgical. The medical treatment is along etiologic and symptomatologic lines. Syphilis and the constitutional dyscrasias, particularly the hemorrhagic diathesis, must be considered. The bleeding and clotting time should always be determined. If this is delayed, efforts should be made to bring it to a normal state. Valledor recommends the use of calcium chloride, thromboplastin, fibrinogen, gelatinized serum and normal horse serum. Hemotherapy is also recommended.

The symptomatic treatment covers such conditions as asphyxia, convulsions, hypertension, hyperthermia and hypothermia.

Lumbar puncture is beneficial in two ways: It reduces intracranial pressure and permits partial removal of accumulated blood. Lumbar puncture in this condition is not without danger and should generally not be undertaken until the bleeding and clotting time has been brought to a normal state. The author considers the procedure unsafe and dangerous for at least seventy-two hours after the onset of the hemorrhage. Cisternal puncture is often more beneficial. Ventricular puncture is rarely indicated. Surgical intervention is indicated either during the acute period or after the condition is in the chronic state. In both instances decompression is the primary object of the operation. SCHLUTZ, Chicago.

SEVERE CASE OF WINCKEL'S DISEASE. MARJA GUTMANOWA, Pedjatrja polska **14**:212, 1934.

Winckel described this fatal malady in 1879; at that time twenty-three newborn died of it in Dresden. The disease occurs in the new-born and is characterized by cyanosis, jaundice, bloody urine, collapse and convulsions; death occurs within from twenty-four to forty-eight hours.

French authors described the disease before Winckel; they called it "maladie bronze hématique." The cause of this disease is not known; however, some authors claim that it may be due to chemical poisoning by a substance belonging to a group of phenols.

In the case of Winckel's disease reported the patient was treated with four blood transfusions, but the treatment failed in this particular case.

KRUPINSKI, Chicago.

NEONATAL RICKETS. S. YOSHIMOTO and K. ITAMI, J. Pediat. (Tokyo), no. 415, Dec. 30, 1934, p. 1836.

The authors made a roentgenographic examination of the distal end of the ulna of one hundred new-born infants and reported the following observations: (1) marked rachitic changes, 41 per cent; (2) slight, 42 per cent, and (3) none, 17 per cent. From these results the authors conclude that rickets may begin in intrauterine life as well as in the postnatal period and that, therefore, no definite time can be assigned to its onset. KATO, Chicago.

TETANY OF THE NEW-BORN. H. M. GREENWALD and M. PALINSKY, Acta pædiat. **17**:386, 1935.

It was formerly held that tetany due to hypocalcemia does not occur in infants under 3 months of age and that it is always associated with active or healing rickets. In recent years this opinion has been revised. It is now known that tetany may occur in very young infants, even during the neonatal period, and that it may arise independent of demonstrable rickets. Numerous examples of tetany of the new-born has been reported since Kehrer's paper was published in 1913; in some of the reported cases the diagnosis has been based on insufficient evidence. Convulsions, alone or even when accompanied by Chvostek's sign or a positive peroneal reflex, are not pathognomonic of tetany in the new-born infant. A secure diagnosis of tetany at this age can be made only when the concentration of calcium in the blood serum is found to be significantly lowered. The mean value of the serum calcium of new-born infants is approximately 12 mg. per hundred cubic centimeters, instead of 10 mg. per hundred cubic centimeters as in older children. Hence, instead of the critical value of 7.5 mg. per hundred cubic centimeters established by Kramer and Howland for the diagnosis of tetany in infants, it seems fair to assume an arbitrary level of 8 mg. as the value to which the concentration of the serum calcium may fall before a diagnosis of tetany of the new-born can be made. An equally important diagnostic criterion is that the symptoms presumably produced by tetany show a specific response to calcium therapy.

The pathogenesis of tetany of the new-born is uncertain. Alkalosis resulting from vomiting has been suggested as a cause, but this explanation has been abandoned generally, at least with reference to the majority of cases. Deficiency of calcium in the diet of the mother during the period of gestation may conceivably play an important rôle; this point has not been adequately investigated. Anatomic injury to the parathyroid glands does not appear to be a generally dependable explanation, although it is likely that a temporary disturbance of the function of these glands may be inculpated in some cases. Unrecognized deficiency of vitamin D requires more study.

Three cases of tetany in new-born infants are reported, together with the case of another infant whose behavior simulated tetany but who was suspected finally, on purely clinical grounds, of having suffered an intracranial hemorrhage. The value of electric reactions in the diagnosis of tetany at this age is not discussed. A good bibliography is appended.

McCUNE, New York.

Acute Infections

THE SMALL SPLEEN IN MALARIA SURVEYS. PAUL F. RUSSELL, Am. J. Trop. Med. **15**:11 (Jan.) 1935.

Russell briefly reviews the literature on the status of the splenic index in malaria and presents some evidence to indicate that this has some useful significance. He describes a technic for palpating the spleen and gives his results with this technic on tuberculous children as well as those in malarial districts. He concludes from his experience and from the reports of others that splenic palpation is a reliable and useful method of obtaining an approximate measure of malaria in a community.

He further concludes that the spleens which by Darling's technic are palpable only on inspiration have a useful significance in malariometry because Darling showed that 54.5 per cent of children with a spleen of this size in his series had at the same time malaria parasites in the blood and that these spleens were susceptible to quinine therapy. In the author's experience, 45.5 per cent of children with these small spleens had positive blood smears, and only 5 per cent of children without malaria had palpable spleens. He also concludes that the more malarious a community the greater the number of spleens that are palpable on inspiration and that these patients may be divided into three classes: (*a*) nonmalarious persons

whose spleens are palpable for some reason not malarious, (*b*) nonmalarious persons whose spleens are palpable because of a past attack of malaria and (*c*) malarious persons whose spleens are only slightly palpable because the attack of malaria has just begun or for some reason has not resulted in enlarging the spleen much.

BURPEE, Augusta, Ga.

SUPRARENAL GLAND AND SEROTHERAPY IN THE TREATMENT OF WHOOPING COUGH: A CLINICAL STUDY. ORVILLE BARBOUR, Arch. Pediat. **57**:143 (March) 1935.

Each of one hundred and ninety-two patients (infants and children) was given desiccated whole adrenal gland at regular intervals throughout the course of whooping cough. Thirty-eight were given thyroid and adrenal gland. Forty-eight were treated with one of three nonspecific protein serums in addition to the adrenal extract. Forty of the patients received injections of pertussis vaccine, twenty-three of them straight pertussis vaccine and seventeen of them mixed vaccine.

Barbour believes that by combining the use of whole adrenal gland given by mouth (and occasional thyroid) with some form of serotherapy, probably with a pertussis vaccine, one may anticipate a marked decrease in the severity and duration in clinical cases of whooping cough.

There were no controls by which one could judge the relative merits of this form of therapy.

WADDELL JR., University, Va.

POSTANGINAL SEPSIS: REPORT OF NINE CASES. MARK S. REUBEN, Arch. Pediat. **57**:152 (March) 1935.

Nine cases of sepsis following infections about the throat are reported, with a discussion of the many phases of this type of infection.

WADDELL JR., University, Va.

DIPHTHERIA IMMUNIZATION IN PRIVATE PRACTICE. KING G. WOODWARD, Illinois M. J. **67**:244 (March) 1935.

In this paper Woodward reports an analysis of his experience with immunization against diphtheria in private practice over a period of three years and the results of the concerted cooperative efforts of the physicians of Winnebago County toward decreasing the incidence and mortality of diphtheria in that county.

His observations led him to conclude that in his series of five hundred and three cases 3 cc. of diphtheria toxoid proved to be 100 per cent effective in immunizing children against diphtheria. The best age at which to start immunization is from 6 months to 1 year. A final Schick test six months after the last injection is imperative. Immunization against diphtheria is best carried out by the family physician in his own office as a part of a perpetual educational program.

BARBOUR, Peoria, Ill.

EFFECT OF DISSOCIATION ON SPECIFICITY OF HEMOLYTIC STREPTOCOCCI. RUTH TUNNICLIFF, J. Bact. **29**:37 (Jan.) 1935.

Tunnicliff isolated and studied one hundred and five cultures of hemolytic streptococci during a hospital epidemic of scarlet fever. Streptococci apparently specific for scarlet fever were identified in cultures from carriers and patients without a rash but suffering from sore throat and infections of the nasal sinuses and the ears. These streptococci were recognized by the fact that they formed conical colonies which did not turn chocolate agar green and were specifically opsonified.

Eight of the ten strains of opsonically nonspecific hemolytic streptococci from conical and convex colonies which greened chocolate agar were shown to be dissociants of Streptococcus scarlatinae when they were reverted to cocci which

formed conical nongreening colonies and were now opsonified specifically by anti-scarlatinal streptococcus horse serum.

It is obvious that to determine the specificity of bacteria it is necessary to use both a specific serum and a stable organism and that dissociating strains are unsuitable for either specific immunization or immunity tests. Overimmunization may also produce a nonspecific serum. The opsonic test has the advantage that suspensions for the test can be made from the growth on a chocolate agar plate on which changes in the color and type of the colony may readily be seen. Fluid cultures for agglutination and toxin-neutralization tests should therefore be subcultured on chocolate agar just before the experiment to determine whether the culture has dissociated during the incubation period. A dissociating strain will show specific immunologic reactions only if the specific factor predominates.

STOESSER, Minneapolis.

PREPARATION OF DIPHTHERIA TOXOID ADSORBED ON CALCIUM PHOSPHATE. AUGUSTUS WADSWORTH, JAMES J. QUIGLEY and GRETCHEN R. SICKLES, J. Bact. **29**:44 (Jan.) 1935.

The authors adopted the following method, which has been found to give a yield of 90 per cent or more in flocculating units: To 100 cc. of diphtheria toxoid is added 10 cc. of a 10 per cent solution (1 Gm.) of calcium chloride, followed by 20 cc. of a 10 per cent solution (2 Gm.) of di-sodium phosphate. An excess of calcium chloride is essential to avoid the dilution of the toxoid. Complete adsorption requires about twenty minutes at room temperature. The supernatant liquid (p_H 6.2 $\pm$) is removed; the precipitate is washed twice with water and three times with physiologic solution of sodium chloride and suspended in solution of sodium chloride. The resulting product should be free from calcium chloride, with the p_H approximately 7. This preparation remains in suspension for a longer period than does alum-precipitated toxoid. The final reaction is about neutral; that of the alum preparation is acid. The antigenic activity of this calcium-precipitated toxoid, as shown by the antitoxin content of the blood serum of guinea-pigs after immunization, was equal to that obtained with alum preparations of toxoids.

STOESSER, Minneapolis.

ACTIVE IMMUNIZATION OF EXPERIMENTAL ANIMALS AND CHILDREN AGAINST POLIOMYELITIS WITH FORMALIN-INACTIVATED VIRUS SUSPENSION. MAURICE BRODIE, J. Bact. **29**:65 (Jan.) 1935.

The poliomyelitis virus was inactivated with either a 0.2, a 0.1 or a 0.05 per cent solution of formaldehyde at incubator temperature. This vaccine appeared to produce no reactions in animals. The vaccine was then given to two series of children, the first consisting of twelve and the second of twenty children, whose ages ranged between 1 and 7 years. The suspension of the virus used for preparation of the vaccine was cultured aerobically and anaerobically before it was treated with a 0.1 per cent solution of formaldehyde for from twelve to sixteen hours, twelve hours being the time required to inactivate the virus. In the first series, five received a single dose of 5 cc.; the others were given a second dose either eleven or thirteen days later. In the second series, half were given 5 cc. and the other half 2.5 cc. of antigen, and half of each group received one and two doses, respectively. From 1 to 2.5 cc. was given intracutaneously; the remainder was given subcutaneously. The material was injected into the skin of the abdominal wall. The children were carefully observed for local and general reactions, and the temperatures were recorded four times daily. There was no apparent general reaction or discomfort and at no time any febrile manifestations that could be attributed to the vaccine. The local reaction was negligible, consisting only of some induration in those receiving the larger amounts intracutaneously. The first dose did not render the children sensitive to the second dose.

To determine the degree of immunity produced by the vaccine, the neutralizing power of each serum was tested before, and two or four weeks after, the administration of the vaccine. In each instance the antibody or antiviral content of the serum was determined quantitatively by estimating the number of minimal completely paralyzing (M. C. P.) doses that the virus neutralized. The M. C. P. dose represents the smallest amount of virus-containing tissue that will produce complete and rapid paralysis in a monkey weighing from 2.5 to 4 Kg. within thirteen days. Almost all the children showed, prior to immunization, a small amount of neutralizing substance. Up to the present only the first series have been completed, and all the children have shown an appreciable response to the antigen. The blood serums of six children neutralized between one hundred and two hundred, and the other six, between two hundred and six hundred, additional infective doses of virus when examined three weeks after immunization. The immunity developed within a week.

STOESSER, Minneapolis.

ANTIGENIC RELATION OF GRAVIS STRAINS OF DIPHTHERIA BACILLI AS COMPARED WITH PARK 8 STRAIN. S. ETRIS, J. Infect. Dis. **55**:220 (Sept.-Oct.) 1934.

A more severe type of diphtheria organism has been found in many parts of the world and has been called "diphtheria gravis" (Park 8). Antitoxin neutralizes the toxin of this organism and protects guinea-pigs given fatal doses. There is a quantitative difference, however, in that gravis antitoxin is more specific against gravis toxin than Park 8 antitoxin. One London strain of gravis was serologically different in type from the other gravis strains.

TOOMEY, Cleveland.

DIPHTHERIA IMMUNIZATION WITH A SINGLE INJECTION OF HIGHLY PURIFIED FORMOL TOXOID AND AL $(OH)_3$. C. N. LEACH, C. JENSEN and G. PÖCH, J. Lab. & Clin. Med. **20**:451 (Feb.) 1935.

A toxoid precipitated with aluminum hydroxide was given to 553 school children. One dose of 2 cc. was given. Twelve and eight-tenths per cent showed local or general reactions. Those children who had had diphtheria showed twice as many reactions as those who had not had it.

Schick tests were not done, but the antitoxin content of the blood was determined before, and twenty-eight days after, the injection of the antigen. In every case there was an increase in the antitoxin content of the blood, and in most instances there was a marked increase. None of this group contracted diphtheria, but in a control group of 175 children 7 cases of diphtheria developed. In no instance was a negative phase demonstrated.

MCMURRAY, Galveston, Texas.

THE HETEROPHILE ANTIBODY REACTION IN THE DIAGNOSIS OF INFECTIOUS MONONUCLEOSIS. E. M. BUTT and A. G. FOORD, J. Lab. & Clin. Med. **20**:538 (Feb.) 1935.

The technic of this test is described. In seventeen cases of infectious mononucleosis sheep cell agglutinins were found in the serum to titers varying from 1:64 to 1:2,048. In one patient who had the disease seventeen months previously, no heterophile antibodies were demonstrated.

In a series of four hundred and twelve patients hospitalized for various other diseases, 81 per cent showed no sheep cell agglutinins in dilutions of 1:4 or higher. In the remaining 19 per cent the titer of agglutinins did not exceed 1:8 except in one case in which the antibodies were present in a 1:16 dilution of the serum.

The authors consider this test a valuable aid in diagnosing infectious mononucleosis.

MCMURRAY, Galveston, Texas.

A New Method of Treatment for Diphtheria with Antitoxic Serum. A. I. Jarotzky, M. Rec. **141**:125 (Feb. 6) 1935.

The method of treatment carried out by Jarotzky was as follows:

Every patient (child or adult) on admission to the hospital received 10,000 units of serum intramuscularly. In grave conditions 20,000 units was first given, and this dose was repeated in a few hours. After the first day the patient received 10,000 units daily until all the membrane as well as the swelling and hyperemia of the surrounding parts had disappeared. Also, if there were general symptoms present, such as faulty heart tones, or if any new symptoms appeared, treatment was continued. Of three hundred and seventy-seven patients treated by this method, only nine died, and in two of these the condition was not true diphtheria. The most satisfactory results were obtained in the cases of laryngeal diphtheria. The author came to the conclusion that fatal results from diphtheria were due to: unsystematic use of insufficient doses of serum and changes of cardiac activity due to toxic influence, with treatment by cardiac stimulants instead of additional doses of antitoxin. The serum must be of sufficiently high titer, 2,000 units per cubic centimeter.

Williamson, New Orleans.

Skin Diphtheria. Legrand A. Damon, New York State J. Med. **34**:1029 (Dec. 1) 1934.

A case of this rare condition is reported in a girl 15 years of age at Craig Colony, Sonyea. The condition resembled impetigo and spread over the face in three weeks. The diagnosis was made by culture and was proved by treatment with antitoxin.

Aikman, Rochester, N. Y.

Results Obtained in a Relatively Small Community Using the Single Dose Toxoid Method for Immunization Against Diphtheria. H. J. Shelley, New York State J. Med. **35**:19 (Jan. 1) 1935.

The department of health of Middletown, N. Y., has used and advises the use of "one-dose toxoid." By its use 92 per cent of the children under 5 years of age have been immunized, putting this city ahead of other cities in the group with a population of 10,000. Work in clinics and visits of nurses to the homes are reduced.

Aikman, Rochester, N. Y.

An Outbreak of Dysentery Caused by the Sonne Type Bacillus. Harry J. Sears, Joseph B. Bilderback, Carl G. Ashley and Martha Rohner, Northwest Med. **34**:37 (Feb.); 95 (March) 1935.

Sonne, in 1914, described the organism that bears his name. It was probably described earlier by Duval and Shorer, in 1902, and it was described later by d'Herelle, in 1916. It usually causes dysentery following a mild course, often with early vomiting and delayed diarrhea. The symptoms usually improve rapidly after forty-eight hours. Frequently, mild infection of the upper respiratory tract is present. Occasionally the cases are severe. Complications are relatively uncommon. The incidence is greatest in children, particularly between the ages of 4 and 7 years. Incubation periods of three or four days are most common.

Eighteen cases of dysentery are reported from one hospital in one season. Of these ten were proved to be cases of Sonne dysentery by culture or by agglutination tests. Blood was reported in the stools in eight. The Sonne bacillus differs from the Shiga bacillus in fermenting mannitol and from the Flexner bacillus in producing acid in lactose after some days of incubation.

A good bibliography is included.

Scott, Philadelphia.

EPIDEMIC PAROTITIS COMPLICATED BY ACUTE APPENDICITIS. WALTER B. SEELYE, Northwest Med. **34**:44 (Feb.) 1935.

A girl, aged 6, on the third day of mumps vomited once. On the fourth day a blood count showed 14,200 leukocytes with 76 per cent polymorphonuclears. At operation an acutely inflamed appendix covered with fibrin and gangrenous at the tip was found. She went home on the eleventh day, well. The blood count was of value in this instance, as an absolute and relative lymphocytosis is present for from ten to fourteen days in this disease. In a normal child fewer lymphocytes and more polymorphonuclears would be expected in the presence of an acute inflammatory process.

SCOTT, Philadelphia.

DIPHTHERIA IMMUNIZATION. A. H. FLICKWIR, South. M. J. **28**:185 (Feb.) 1935.

Flickwir emphasizes the importance of immunization against diphtheria and points out the great progress made in his own state, Texas. All the large cities and county health organizations are carrying on diphtheria immunization campaigns continuously. The health organizations are receiving splendid cooperation from the medical profession. It is practically a routine practice among Texas physicians to immunize young babies before they are 1 year old. Toxoid is used for most of the immunizations. Many of the health officers use three doses, but some use one dose of alum-precipitated toxoid.

SCHLUTZ, Chicago.

CATARRHAL DIPHTHERITIC CONJUNCTIVITIS. J. FRANÇOIS, Brit. J. Ophth. **19**:1 (Jan.) 1935.

The clinical histories of five patients with a catarrhal form of diphtheritic conjunctivitis are given. The disease is found principally in new-born infants, in the first days following birth. It is usually bilateral; the second eye may be attacked rather rapidly or as late as six weeks after the first eye. The secretion is mucopurulent and of a canary yellow color. The bulbar conjunctiva is slightly congested. The skin of the lids is erythematous. Preauricular adenopathy frequently exists. Mucopurulent rhinitis is common. Corneal complications may occur.

François' conclusions are: 1. Besides the pseudomembranous forms of diphtheritic conjunctivitis there is a merely catarrhal form. 2. The latter is often met with in new-born infants and should be ranked among the ophthalmias neonatorum. 3. It shows no pathognomonic sign and has the aspect of nearly all mucopurulent conjunctivitis. 4. Because of its clinical aspect, it seems to be the most benign of all types of diphtheritic conjunctivitis; however, it may be complicated by serious corneal lesions. 5. It is refractory to the ordinary treatment, but it heals completely and rapidly under the influence of antidiphtheritic serotherapy.

A bibliography is appended to the article.

ZENTMAYER, Philadelphia. [ARCH. OPHTH.]

PREVENTIVE IMMUNIZATION IN AN INSTITUTIONAL EPIDEMIC OF SCARLET FEVER. F. L. SCOTT and W. MORTON, Brit. M. J. **1**:12 (Jan. 5) 1935.

This outbreak of scarlet fever occurred in a hospital for the mentally deranged. It affected the female patients and nursing staff to the extent of forty-three cases. All the patients were adult, and fourteen were over the age of 40, one being 76 years of age. In addition to the ordinary procedure of isolation and the like, Dick tests were made on the entire population of the institution, with the exception of a few persons who were immunized without a previous Dick test. All susceptible persons among the group other than those mentioned were given a course of four weekly intramuscular injections of scarlet fever prophylactic toxin. In addition, those attendants who were on service on both the female and the male side of the hospital were immunized to prevent them from carrying the disease

to the other side of the hospital. No patients and only one nurse with negative Dick reactions contracted scarlet fever. Two patients and three nurses with positive reactions contracted the infection before they could be immunized. Of the total one hundred and seventy-eight persons who received the full course of immunization none contracted scarlet fever.

ROYSTER, University, Va.

DIPHTHERIA IN THE TROPICS: A SUBCLINICAL DISEASE IN NEGROES. GEORGE KINNEARD, Brit. M. J. **1**:201 (Feb. 2) 1935.

This is a statistical study from the Bahama Islands, with a comparison of the incidence of diphtheria in the subtropical part of the United States. The point in this article of especial interest is: The Negro, as has long been known in the United States, is less susceptible to diphtheria than is the white child, and although diphtheria is observed with perhaps a little more frequency in the Negro than is usually supposed, it is, generally speaking, a subclinical disease. The author's summary is as follows:

"1. The Negro resists infection with C. diphtheriae better than the white.

"2. C. diphtheriae can be isolated from the throats of coloured children in areas where no cases are reported.

"3. Schick tests reveal a high degree of antitoxic immunity in coloured populations.

"4. Diphtheria is an ever-present peril to the white child in the Tropics.

"5. Evidence is submitted which tends to show that diphtheria among coloured persons in the Tropics tends to be subclinical."

ROYSTER, University, Va.

TREATMENT OF SCARLET FEVER. ALEXANDER JOE, Brit. M. J. **1**:483 (March 9) 1935.

An outline of Joe's methods in the treatment of scarlet fever in general practice is given. The general management is outlined. The specific treatment that the author recommends in severe cases is serum. He thinks that this is hardly advisable in the mild cases. In order to prevent serum sickness it is wise to test for sensitivity and desensitize before the administration of the specific serum. An outline of the management of various complications is given.

ROYSTER, University, Va.

THE DIAGNOSIS AND TREATMENT OF MALIGNANT DIPHTHERIA. B. A. PETERS, Brit. M. J. **1**:585 (March 23) 1935.

Peters describes his experience and expresses his opinion as to the differential diagnosis, treatment and other factors of malignant diphtheria. It is to be noted in this article that the dose of antitoxin is rather larger than is usually given in the United States.

ROYSTER, University, Va.

THE TREATMENT OF MEASLES. WILLIAM GUNN, Brit. M. J. **1**:597 (March 23) 1935.

A general outline of the author's methods in the treatment of measles is given.

ROYSTER, University, Va.

TREATMENT OF WHOOPING-COUGH. W. T. BENSON, Brit. M. J. **1**:657 (March 30) 1935.

The author outlines his methods of handling cases of whooping cough.

ROYSTER, University, Va.

SOME RECENT ADDITIONS TO OUR KNOWLEDGE OF INFECTIOUS DISEASES AND THEIR SIGNIFICANCE. C. J. MCSWEENEY, Irish J. M. Sc., March 1935, p. 108.

The use of the Dick test is of value in institutions to prevent outbreaks of scarlet fever. The susceptible patient can be given scarlatina antitoxin which prevents them. The Schultz-Charlton test is of value in scarlet fever.

The use of convalescent serum and adult serum is of value in the control of measles. A Wassermann test should always be done. The cough plate for the diagnosis of whooping cough in the early stage is of value. The use of vaccines in the treatment of whooping cough is not striking.

The sedimentation rate of the red blood cells is useful in determining when the patient convalescing from infectious disease may be allowed up with safety. The after-care of infectious diseases is often not carried out completely enough. Many children are left very susceptible to other infections.

Immunization against diphtheria is now carried out on a large scale. The use of the Moloney intradermal test to determine those who are susceptible to the protein in the toxoid is used frequently but is not necessary in young children. The lack of a positive swab from a patient with diphtheria should not overrule one's clinical impression. The work which has divided diphtheria into various strains, viz., gravis, mitis and intermediate, is interesting, but whether it is of more than academic interest is not known.

A note on puerperal fever is included. The author advises the daily use of scarlet fever antitoxin. He quotes a report of two authors who gave scarlet fever antitoxin to 1,243 obstetric patients; only one of these contracted puerperal fever.

SNELLING, Toronto, Canada.

RECENT TRENDS IN DIPHTHERIA PROPHYLAXIS. J. C. SAUNDERS, Irish J. M. Sc., March 1935, p. 117.

Saunders treated about 12,000 children with various materials used for immunization against diphtheria. The children were retested, and it was found that 90 per cent of those not immunized had been given toxin-antitoxin. Formaldehyde toxoid is recommended for all children under 6 years of age and gives few reactions in that group. In cases in which reactions occurred on the first injection, floccules of alum toxoid were used in the second. Saunders believes that floccules of alum toxoid are the best for the private practitioner to use. He thinks that immunity can be established by a single dose of the precipitated toxoid.

SNELLING, Toronto, Canada.

OBSERVATIONS ON THE TOXIC FRACTIONS OF SCARLATINAL STREPTOCOCCI. C. A. GREEN, J. Hyg. **35**:93 (Feb.) 1935.

A study of the power of toxin production has failed to distinguish scarlatinal from nonscarlatinal strains of Streptococcus haemolyticus. Because of the complex nature of the toxins, the tests for immunity are at times misleading. High percentages of pseudoreactions have been reported by different authors. The existence of exotoxin and endotoxin in culture filtrates is confirmed in this paper. Extensive data on the production, destruction and testing for the different fractions are given.

The concentration of exotoxin in 0.5 per cent dextrose broth cultures was at a maximum after ninety-eight hours of incubation and thereafter progressively diminished. In addition to the heat-labile exotoxin from cultures from patients with scarlet fever, the existence of an acid-insoluble toxic fraction in forty-eight hour cultures was confirmed. This was extremely heat-resistant, three hours of boiling at 100 C. being required to inactivate it.

In skin tests the reaction to crude filtrate was found to be that of the sum of the exotoxin fraction and of the acid-insoluble fraction present in the filtrate.

Scarlatinal streptococci, varying widely in serologic characteristics, produce a single uniform heat-labile exotoxin demonstrable by cutaneous reactions in

susceptible persons. They also form the other type of toxic product which is like the endotoxins; its relationship to scarlatina and its immunity phenomena are still a problem of practical importance and require further investigation.

JANNEY, Wauwatosa, Wis.

TOXIC DIPHTHERIA: THE SIGNIFICANCE OF SUGAR-TOLERANCE CURVES AND THE VALUE OF INSULIN. NORMAN D. BEGG, Lancet **1**:480 (March 2) 1935.

It was found that in diphtheria the response of the body to intravenous injections of dextrose was constantly abnormal and resulted in higher blood sugar findings. The degree of variation was found to be a sensitive index of the severity of the attack and served as a reliable guide to the progress of the disease. A fairly close association appeared to exist between abnormalities in tolerance curves and involvements of the cardiovascular mechanism. The injection of insulin in addition to antitoxin and dextrose did not appear to change the character of the abnormal curves or to influence the course of the disease, as judged by the fatality and complication rates.

LANGMANN, New York.

THE SCHICK TEST AND ACTIVE IMMUNIZATION IN RELATION TO EPIDEMIC DIPHTHERIA. H. J. PARISH and JOYCE WRIGHT, Lancet **1**:600 (March 16) 1935.

The occasional occurrence of diphtheria in persons with a negative Schick reaction shows that absolute immunity to clinical infection has not yet been attained by the methods of testing and immunization now in vogue.

The "Schick-level" in man shows considerable variation. A negative reactor may have, at the time of the Schick test, as little as from $\frac{1}{250}$ to $\frac{1}{500}$ unit of circulating antitoxin per cubic centimeter of serum. If such a person contracts the disease it will, however, almost always be mild.

The general principles which underlie active immunization are sound, but the amount of circulating antitoxin required to insure safety against attack by certain strains of gravis and intermediate types is higher than that indicated by the present Schick level. Further research is suggested with "multiple Schick-toxins" in order to determine the level of immunity necessary to confer protection against these infections.

LANGMANN, New York.

PSITTACOSIS IN AUSTRALIAN PARROTS. F. M. BURNET, M. J. Australia **2**:743 (Dec. 8) 1934.

The psittacosis virus was isolated from parrots obtained from dealers in Adelaide and Melbourne. Because of the general assumption that psittacosis is not present among Australian parrots this study was carried out by Burnet in order to definitely decide the matter.

GONCE, Madison, Wis.

FATAL CHICKENPOX IN A NEW-BORN INFANT. F. BARON, Bull. Soc. d'obst. et de gynéc. **24**:65 (Jan.) 1935.

This case is reported because of the usually benign course of varicella and its rare occurrence in the new-born. The mother of the infant was 28 years of age and was admitted to the hospital during the course of an epidemic of chickenpox. The eruption appeared on her skin at the time she went into labor. The infant, her second child, was normally delivered and weighed 3,370 Gm. The mother made an uneventful recovery. At the age of 8 days the lesions of chickenpox appeared on the infant's skin. The disease ran its usual course without fever for three days, when the eruption appeared in the mouth. Fever developed; the infant became very toxic and died the following night. There were no convulsions and no signs of asphyxia. The French literature on this subject is briefly reviewed. Baron points out that the usual immunity of the new-born to varicella is probably due to protective antibodies from the maternal blood. When, however, the mother

contracts the disease at term these conditions do not obtain, and the chickenpox which the infant contracts at that time should not be regarded as a benign infection. As the average incubation period of chickenpox is from eleven to fifteen days and as the infant's rash in the case here reported appeared at 8 days, the probability is that the infant was infected through the placental circulation. The author also remarks that chickenpox in a woman at term may at times be fatal and states that the use of convalescent serum has not given particularly good results.

GLASER, Rochester, N. Y.

A CASE OF DIPHTHERIA IN A NEW-BORN INFANT. VORON, BROCHIER and CONTAMIN, Bull. Soc. d'obst. et de gynéc. **24**:210 (March) 1935.

The authors report a case of fatal diphtheria in an infant delivered by low cesarian section. The symptoms appeared on the fifth day after birth, at which time there was an extensive pharyngeal membrane. No carrier or other source of infection could be found. A culture from the mother's throat was negative. The diagnosis was confirmed by culture of the membrane. Serum was given, but the child died. The literature on diphtheria of the new-born is briefly reviewed. From this the author concludes that the disease, while rare, is very serious, being fatal in most cases, despite any form of therapy. The diphtheria is usually nasal in form, and the presence of coryza with a blood-stained discharge, even in a new-born infant, should lead to a suspicion of diphtheria.

GLASER, Rochester, N. Y.

ANTIDIPHTHERITIC SEROTHERAPY AND ACUTE ARTICULAR RHEUMATISM. JULIEN HUBNER, Bull. Soc. de pédiat. de Paris **31**:451 (Nov.) 1933.

A report is given of three children who had an immediate aggravation or onset of severe rheumatic carditis coincident with the manifestations of serum reaction, such as urticaria and pains in the joints accompanied by fever, which followed the administration of antidiphtheritic serum. It is thought that the rheumatic disease probably is latent in such cases, and the danger of a possible relapse after a serum reaction in a child who has previously had rheumatic disease, or the onset of clinical manifestations of the disease in a case in which it may previously have been latent, is stressed. However, rheumatic disease is not considered as a contraindication to the injection of antidiphtheritic serum when diphtheria is diagnosed.

BENJAMIN, Montreal, Canada.

PROPHYLAXIS AGAINST MALARIA IN CHILDHOOD. GILLOT and SARROUY, J. de méd. de Paris **55**:161 (Feb. 21) 1935.

The authors conclude that the prevention of malaria among infants and children in Algeria demands: (1) treatment of all pregnant women afflicted with malaria, (2) careful examination of infants and small children who, harboring malaria in an occult form, may be the source of an epidemic. (3) the methodical daily administration of quinine to children of all ages in infected areas during the time of an epidemic and (4) an effort to reduce the cost of quinine.

LESLIE, Evanston, Ill.

TREATMENT OF DIPHTHERITIC PARALYSIS. J. COMBY, J. de méd. de Paris **55**:164 (Feb. 21) 1935.

Comby has used serum therapy in the treatment of diphtheritic paralysis since 1903. From his experience he thinks that it is well worth trying in all cases, even though serum was given early. He advises a dose of from 10 to 20 cc. at three or four day intervals until from 80 to 100 cc. has been given.

LESLIE, Evanston, Ill.

SUBACUTE ENCEPHALOMYELITIS DURING THE COURSE OF SCARLET FEVER. FERRAND, SCHAEFFER and MARTIN, Paris méd. **1**:245 (March 23) 1935.

A child 6 years old showed during the course of benign scarlet fever two episodes of encephalitis. The first occurred on the fourth day of the disease and was characterized by somnolence, prostration, a positive Kernig's sign, stiffness of the neck, photophobia and vasomotor disturbances. The cerebrospinal fluid showed 212 cells, with a predominance of polymorphonuclear cells. The acute phase lasted four days and was followed almost immediately by a second episode. This was characterized by a rapid rise in temperature, loss of psyche, the sudden onset of paraplegia and, on the second day, an attack resembling jacksonian epilepsy. Complete recovery occurred.

LESLIE, Evanston, Ill.

CONJUNCTIVAL MANIFESTATIONS IN MEASLES DURING INCUBATION. G. DE TONI, F. CARAMAZZA and G. PUGLISI-DURANTI, Pediatria **43**:249 (March) 1935.

The authors made an intensive study of the conjunctival membranes of forty-six children who contracted measles during an epidemic in Bologna. The examinations were direct and were made by means of the slit lamp and corneal microscope.

Eighty-three per cent of these patients presented, on the inferior tarsal conjunctivae, certain nodules which were characteristic because of: (1) location, (2) number (being few), (3) oval shape, (4) opal color, (5) a surrounding hyperemic (red) zone, (6) rapidity of development and (7) their presence during incubation only, after which they disappear.

Of the children exposed to the disease but who did not contract it, 87 per cent failed to present these characteristic nodules. Several hypotheses are suggested to explain this phenomenon, and the authors propose to continue their studies with a view of establishing whether these nodules represent a specific reaction of the conjunctival membrane to the virus of measles.

Photomicrographs of the nodules add to the value of the presentation.

SIGNORELLI, New Orleans.

ACUTE AMEBIASIS. F. LO PRESTI-SEMINERIO, Pediatria **43**:314 (March) 1935.

A case of acute amebiasis with a very rapid course and terminating in death on the ninth day is reported in a girl of 2 years.

SIGNORELLI, New Orleans.

SERUM THERAPY IN MALIGNANT DIPHTHERIA. G. TRON, Riv. di clin. pediat. **33**:301 (March) 1935.

In the Agostino Bassi Contagious Hospital of Milan, from 1906 to 1934, 10,196 patients with diphtheria have been treated, with approximately a 10 per cent mortality. Of these cases, 179 were cases of primary malignant diphtheria, with a 64 per cent mortality.

Malignant diphtheria is described by the author as a definite clinical entity not to be confounded with the ordinary forms of severe diphtheritic infection.

In malignant diphtheria the patient appears very sick from the onset of the illness and has a high temperature (about 104 F.), intense pain in the throat, vomiting and abdominal pain. The membrane is abundant, brownish black and hemorrhagic, extends over the tonsils, uvula and palate and is very fetid; the odor is characteristic. The edema of the tonsils is conspicuous. Rhinitis exists, with a profuse serosanguineous secretion which causes excoriation of the skin of the upper lip. The lymph glands of the neck are enormously swollen, giving the "bull-neck" appearance. The edema spreads to the chest. The color of the patient is greenish white, the voice husky and nasal. The pulse rate is weak and rapid and the blood pressure low. Albuminuria and hyperazotemia are present. Epistaxis is frequent, while purpuric spots are present, especially at the site of injection.

There is some difference of opinion among clinicians whether this type of malignant diphtheria is a hypertoxicity from the diphtheria bacilli or whether it is a combination of diphtheritic toxicity with a streptococcic infection.

Among patients given antitoxin on the second day of the disease the condition was fatal in 33 per cent; among those given antitoxin on the third day, in 52 per cent; among those given antitoxin on the fourth day, in 60 per cent, and among those given antitoxin later, in 76 per cent.

The relation of the dose of antitoxin to fatalities is given in the following table:

Doses of Antitoxin	Total Number of Cases	Deaths	
		Number	Percentage
Less than 50,000 units	89	70	78
50,000 to 100,000 units	52	31	59
100,000 to 150,000 units	26	13	50
150,000 to 240,000 units	22	9	40

The author believes that it is advisable to give very large doses of antitoxin (about 200,000 units) in the treatment of malignant diphtheria.

HIGGINS, Boston.

THE RENAL FUNCTION IN DIPHTHERIA. C. DE MURTAS, Riv. di clin. pediat. **33**:327 (March) 1935.

De Murtas studied the renal function of twenty patients with diphtheritic angina; the disease was more or less severe but without definite complications. The renal function was tested by ability to concentrate and to dilute the urine, the phenolsulphonphthalein test and Ambard's constant. Tests were made on admission to the hospital, five days later and on discharge.

In eighteen of the twenty children with uncomplicated diphtheria no diminution of the renal function was found. With the other two children there was a slight and transitory diminution of the renal function.

HIGGINS, Boston.

LABORATORY AIDS IN THE TREATMENT OF MALARIA. MARTIN A. LANDA BACALLAO, Arch. de med. inf. **4**:10 (Jan.-March) 1935.

Laboratory findings should be used even in a typical case to establish the actual species of Plasmodium in malaria. The hanging drop has given the author the best results. The hemogram is one of the safest means for ascertaining the periods of convalescence and cure, on account of the typical lymphocytic reaction, with monocytosis.

SANFORD, Chicago.

CALCIUM GLUCONATE IN THE ERUPTIVE FEVERS. DAVID PILLAR, J. de pediat., Rio de Janeiro **2**:53 (Feb.) 1935.

Pillar uses from 3 to 10 cc. of a 10 per cent solution of calcium gluconate intramuscularly in all cases of exanthems. He gives this every day as long as the condition persists.

SANFORD, Chicago.

THERAPY IN WHOOPING COUGH. R. MUÑOZ BERNABEU, Med. de los niños **36**:42 (Jan.) 1935.

The author describes nine cases of whooping cough in which the patients were treated with antialpha vaccine. Improvement is noted in the majority of cases after the third dose, although six doses are usually given. The duration of the disease was shortened considerably. In two exposed children prophylactic injections were completely successful.

DWYER, Kansas City, Mo.

SCARLET FEVER. NAVANTINO ALVES, Movimento pediat., Belo Horizonte **2**:8 (March) 1935.

The author believes that scarlet fever should be classified into eleven types. These are: benign, ordinary, prolonged, mildly toxic, toxic, hypertoxic, modified (this passes unobserved), noneruptive (this is not diagnosed unless there are other cases in the family), fulminating, complicated and activating (this begins with the benign form and goes on to any other form). SANFORD, Chicago.

MODERN DIAGNOSIS AND THERAPY OF WHOOPING COUGH. H. BISCHOFF, Arch. f. Kinderh. **104**:129 (Feb. 19) 1935.

The method for cultural demonstration of the Bordet-Gengou bacillus according to the method of Chievitz and Meyer does not always give results which can be relied on for confirmation of the diagnosis, especially during the first weeks. The possibility of so-called bacillus carriers for whooping cough is pointed out.

The toxin-free whooping cough vaccine of Petein of the firm of Schering-Kahlbaum appears to influence pertussis favorably in many cases, and because of its relative harmlessness it deserves further careful investigation.

AUTHOR'S SUMMARY. (CRANE, Chicago.)

TREATMENT OF DYSENTERY WITH EXTRACT OF THE POSTERIOR HYPOPHYSEAL LOBE. E. BARLA-SZABÓ, Arch. f. Kinderh. **104**:134 (Feb. 19) 1935.

Good results are reported from the use of extract of the posterior hypophyseal lobe in treating dysentery in children. The extract is said to influence favorably the inflammatory process, the intestinal secretions and peristalsis and the circulation and to promote storage of fluid in the tissues. CRANE, Chicago.

THE RELATIONSHIP BETWEEN THE VIRUS OF ZOSTER AND THAT OF VARICELLA. J. M. LÉVINE, Dermat. Ztschr. **70**:346 (Feb.) 1935.

Lévine describes a case in which bilateral zona occurred on the upper extremities. A week after the zoster cleared typical varicella developed. The author concludes that this is proof that the virus of zoster and that of varicella are frequently not identical. TAUSSIG, San Francisco. [ARCH. DERMAT. & SYPH.]

EXPERIMENTS WITH CONCENTRATED DIPHTHERIA TOXIN DIGESTED WITH FORMALDEHYDE. H. HOLZAPFEL, Monatschr. f. Kinderh. **61**:280, 1935.

The author immunized thirty-one children with a Danish preparation of purified and concentrated diphtheria toxin digested with formaldehyde. The dose is 2 cc. given once. In all cases there were definite infiltration, pain and tenderness. Eight children reacted with fever. Three children with positive Mantoux reactions showed particularly marked local findings.

In association with this work the author compared different methods of determining the diphtheria antitoxin content of the serum. He concludes that the most efficient method is still the classic method of Ehrlich. As regards the efficiency of the new preparation, he will not commit himself, but he is convinced that it is harmless for all patients except those with positive tuberculin reactions.

GERSTLEY, Chicago.

EFFECTIVENESS OF DIPHTHERIA SERUM. U. GRÜNINGER, München. med. Wchnschr. **82**:125 (Jan. 24) 1935.

During the last few years a virulent type of diphtheria has been prevalent in Europe, with a high mortality. As a result, many physicians, especially those in hospitals, have questioned the efficacy of diphtheria antitoxin. Grüninger analyzes the report of Zischinsky on the epidemic of diphtheria in Vienna during

the past few years. The mortality rate for nine hundred and thirty-seven hospitalized patients with severe diphtheria was 43.3 per cent, and Zischinsky concluded that specific therapy in diphtheria had failed. However, by comparing the mortality rate in the entire city of Vienna before and after serotherapy was used one obtains a different impression. During the mild epidemic in 1903 the mortality rate was 10.2 per cent. Between 1927 and 1931 the rate varied from 4.6 to 6.7 per cent. In addition, the author points out that only thirty-five of Zischinsky's patients received serum on the first day of the illness. The serum was given in doses of from 7,500 to 600,000 units intravenously, intramuscularly and subcutaneously. A dose of 7,500 units required 30 cc. of serum. Grüninger therefore concludes that the mortality in diphtheria can be reduced by the early and proper administration of adequate doses of antitoxin. There is no basis for the statement that diphtheria serum is not efficacious.

BRAHDY, Mount Vernon, N. Y.

BENZALDEHYDE REACTION IN THE URINE IN SCARLET FEVER: ITS SIGNIFICANCE IN EARLY DIAGNOSIS AND DIFFERENTIAL DIAGNOSIS. LIPP, München. med. Wchnschr. **82**:295 (Feb. 21) 1935.

The benzaldehyde or urobilinogen reaction is an important test in the early diagnosis of scarlet fever, especially when some other disease is present at the same time. The test for urobilinogen also aids in the differential diagnosis between scarlet fever and diphtheria or a serum exanthem. Since urobilinogen is present in the urine of many normal adults but not present in the urine of children, the test is of significance only in childhood.

BRAHDY, Mount Vernon, N. Y.

THE SCHICK TEST, ANTITOXIN TITER AND SUSCEPTIBILITY TO DIPHTHERIA. CHARLES N. LEACH and GEORG PÖCH, Wien. klin. Wchnschr. **48**:271 (March 1) 1935.

Leach and Pöch state that a negative Schick reaction may lead to false conclusions, and they report seven cases (including findings for the antitoxin titer) in which the patients became ill with diphtheria, although all had shown a marked negative Schick reaction some time before the onset of the disease. The antitoxin titer may indicate susceptibility to the disease in such cases. However, a positive Schick reaction shows clearly that the subject is susceptible to diphtheria.

ABT, Chicago.

TREATMENT OF WHOOPING COUGH WITH BROMIDES. WALTER BELMONTE, Ztschr. f. Kinderh. **55**:134 (May) 1933.

Belmonte claims that he was able to reduce the number and intensity of attacks in whooping-cough in one hundred and seven children by a diet low in salt and the administration of bromides. There were no untoward manifestations resulting from this treatment.

LEVINSON, Chicago.

NECROSIS IN SCARLET FEVER IMITATING LARYNGEAL DIPHTHERIA. A. KÚNSÁGI, Orvosi hetil. **79**:152 (Feb. 9) 1935.

It is difficult to distinguish the necrosis in the throat caused by scarlet fever, especially if this extends to the larynx, from diphtheria. The most important help for this is laryngoscopy and examination for bacilli. Since this necrosis always signifies serious complications, serum against scarlet fever should be given. In case of difficulty in breathing the only correct treatment is intubation.

O. GÖTTCHE, Budapest, Hungary.

FOURTH DISEASE, OR FILATOV-DUKE'S DISEASE, AND LIKE ERUPTIONS. RACHELA LEWI, Pedjatrja polska **14**:196, 1934.

Lewi presents a discussion of an epidemic of the so-called fourth disease that occurred in Lodz in 1933. At present the status of this malady is still unsettled. One school claims that Duke's disease is nothing more than mild atypical scarlet fever. Others claim that the disease is a distinct entity.

Many titles are given to the fourth disease. Some authors call it rubeola scarlatinosa; others, scarlatinella, and still others, parascarlatina A or B.

The disease is apparently harmless. However, it is important to differentiate it early from scarlet fever, erysipelas, infectious erythema and exanthema subitum.

KRUPINSKI, Chicago.

THE FIGHT WITH TYPHUS IN PUBLIC SCHOOLS IN THE CITY OF LODZ. STANISLAUS GUTENTAG, Zycie Dziecka **3**:99 (March) 1934.

The first occurrence of typhus in Poland since the Bolshevik invasion of this country was during the year 1932-1933. However, owing to the hard work of the chief hygienist, Dr. S. Gutenberg, the disease was controlled satisfactorily, with the exception of a few cases here and there. As the disease is spread through lice, the school children were daily inspected and immediately disinfected and the clothes and articles sterilized, and isolation was enforced. Then followed the disinfecting of the homes where the disease broke out. The teachers and parents were instructed to watch for the disease and to notify the health authorities of any new cases.

KRUPINSKI, Chicago.

STUDIES ON RAMON'S FLOCCULATION: IV. SPEED OF FLOCCULATION. T. KOMIYAMA, J. Orient. Med. **21**:108 (Dec.) 1934.

The rate of flocculation of diphtheria anatoxins (Kf) when tested against the same serum has been shown by Ramon (in experiments on horses) and Sdrodovski and Chalapina (in experiments on man) to give an indication of the immunizing value of the preparation, if they have the same Lf value. In studying the factors influencing the rate of flocculation I have found that the Kf is not a value characteristic of a toxin or anatoxin but shows a marked fluctuation under the influence of different factors, the principal one of which is the p_H.

AUTHOR'S SUMMARY.

A STUDY ON THE HISTORY OF BACTERIA ARTIFICIALLY INTRODUCED INTO THE BODY AND THE FACTORS OF INFECTION: III. THE EFFECT OF COOLING THE BODY ON THE INFECTION OF STREPTOCOCCUS HAEMOLYTICUS-SCARLATINOSUS AND DIPLOCOCCUS PNEUMONIAE. N. NISHIKAWA, J. Orient. Med. **22**:7 (Jan.) 1935.

The effect of cooling the body in cases of invasions of Streptococcus haemolyticus-scarlatinosus and Diplococcus pneumoniae was extremely great, and on account of the double influence of bacteria and cooling (unlike the single work of either factor) immense functional and organic havoc was wrought on various organs of the body. Bacteria were passed through the kidneys, which showed histologic evidence of acute glomerular and tubular nephritis.

AUTHOR'S SUMMARY.

SCARLET FEVER ANATOXIN. S. NAGATA, J. Orient. Med. **22**:25 (Feb.) 1935.

The only method of demonstrating the immunizing value of scarlet fever anatoxin was its practical application to preventive immunization of susceptible persons, but in 1932 Veldee found that rabbit ear skin reacted strongly to 1 skin test dose of scarlet fever toxin and could be used for the standardization of anatoxin. Recently, in 1933, he immunized twenty-one rabbits which reacted strongly to 1

sensitizing dose with from 0.2 to 0.3 cc. of toxoid and eighteen with from 15,000 to 25,000 skin test doses of raw toxin and found that sixteen and thirteen of them, respectively, gave negative reactions to 5 skin test doses. Fourteen days later, the reactions of ten rabbits that received a subcutaneous injection of 0.2 cc. of plain broth remained positive after this period. This appears to be the only published experiment ever carried out on animals to demonstrate the antigenicity of scarlet fever anatoxin.

Nagata tried this method and found it reliable as a means of demonstrating the antigenicity of scarlet fever anatoxin; he found evidence of the existence of toxoid in the so-called anatoxin. (The term "anatoxin" is used in the sense of the toxin detoxified by dilute solution of formaldehyde and heat, irrespective of the degree of detoxification). The antigenicity of the combined scarlet fever and diphtheria anatoxin was also demonstrated by means of the test on rabbits.

LESLIE, Evanston, Ill.

STUDIES ON THE DIPHTHERIA TOXIN: IV. THE PRECIPITATION OF DIPHTHERIA ANATOXIN BY ALUM. IV. T. KOMIYAMA, J. Orient. Med. **22**:42 (March) 1935.

The method of enhancing the antigenic value of diphtheria anatoxin by precipitation with alum, introduced by Glenny and his co-workers, has been widely recognized as suitable for the immunization of human beings. Conditions of the precipitation of diphtheria anatoxin by alum have been studied, and the following conclusions were arrived at:

1. The precipitation of diphtheria anatoxin depends not only on the concentration of alum but also on the p_H under which the precipitate is formed, p_H 4 to 5 being the optimum.

2. The more concentrated the alum the more acid becomes the resultant p_H.

3. Less alum is needed for the purified anatoxin to make the resultant p_H the optimum than for the original anatoxin.

4. The addition of one-eighth by volume of a 4 per cent solution of alum to one volume of the anatoxin purified by the calcium phosphate method precipitates most of the active principle, the resultant p_H being about 4.

EDITOR'S SUMMARY.

SIGNIFICANCE OF THE APPEARANCE OF THE TONGUE IN SCARLET FEVER. G. ZUELZER, Acta pædiat. **15**:421 (Sept. 5) 1934.

In volume 15 of the *Acta paediatrica* Zuelzer advanced the claim that both the characteristic exanthem and the secondary complications of scarlet fever can be prevented by the administration of quinine early in the disease. The mortality is also reduced by this measure. The drug must be given by hypodermic injection during the prodromal stage of the infection.

Critics immediately raised the objection that the suppression of the rash made it uncertain whether the patients treated in this manner really had scarlet fever. In order to prove the correctness of the diagnosis in the cases forming the basis of his earlier report, the author obtained photographs of the tongue in various stages of scarlet fever. These were made by a three-color photographic process. The published reproductions are unusually satisfactory examples of the art of illustrating medical subjects in their natural colors.

It is asserted that the early appearance of the tongue and the subsequent evolution of its visual aspects are entirely characteristic of scarlet fever. A certain clinical diagnosis may be made from this evidence alone when other less specific signs and symptoms are lacking.

MCCUNE, New York.

ERYSIPELAS IN YOUNG CHILDREN. E. GORTER, Maandschr. v. kindergeneesk. **4**:51 (Nov.) 1934.

Experience with twenty-six children, of whom only five were 6 years or older, has taught Gorter that it is advisable to treat erysipelas in young children with the ultraviolet ray from a lamp which also sends out short waves. The lamp should have its maximum intensity at the beginning of the radiation, and not only the affected skin should be irradiated but also part of the skin around the eruption. The dose should be about one and one-half times the erythema dose, which must be determined for the sound skin before the beginning of the treatment, as there are great individual variations.

VAN CREVELD, Amsterdam, Netherlands.

BRETONNEAU AND THE FIRST FRENCH LITERATURE ON DOTHIENENTERITIS IN CHILDHOOD. J. H. DE HAAS, Nederl. tijdschr. v. geneesk. **78**:3956 (Sept. 1) 1934.

The history of typhoid fever in children is critically discussed. Whereas usually Taupin and Rilliet in France are regarded as the spiritual fathers of typhoid fever in childhood, the author emphasizes that in reality Bretonneau did the fundamental work long before the authors mentioned.

VAN CREVELD, Amsterdam, Netherlands.

MENINGEAL FORM OF WEIL'S DISEASE WITHOUT ICTERUS AND CONJUNCTIVAL INJECTION. J. M. NOOTHOVEN VAN GOOR, Nederl. tijdschr. v. geneesk. **78**: 4330 (Sept. 22) 1934.

A case of this condition is described in a boy of 14 years with manifest symptoms of meningitis. The patient recovered.

VAN CREVELD, Amsterdam, Netherlands.

Chronic Infections

ARTIFICIAL PNEUMOTHORAX IN THE TEENS. BENJAMIN L. BROCK and ALVIN B. MULLEN, Am. Rev. Tuberc. **30**:653 (Dec.) 1934.

The group of patients forming the basis of this study numbered 367; of these, 267 were white persons and 100 were Negroes. The ages were from 12 to 21 years. Three methods of treatment were used, namely, artificial pneumothorax in 115 cases, phrenicectomy in 82 cases and general routine sanatorium treatment alone in 170 cases.

Practically all the statistics show higher death rates for girls than for boys. In this group, however, the results of treatment were as favorable in the former group as in the latter, provided that the disease was recognized early and properly treated. The end-results in any form of treatment depend primarily on the extent of the disease when the patient is admitted and particularly on whether pulmonary involvement is unilateral or bilateral.

When examination of the sputum gives repeatedly positive results after hospitalization and treatment, the end-results are uniformly poor. Likewise, a favorable result may be expected in the great majority of cases in which examination of the sputum promptly gives negative results.

Regardless of the method of treatment among Negro patients the number of cases of arrested disease was relatively low and the mortality high. Especially in the Negro race are early diagnosis and immediate collapse therapy imperative if arrest of the disease is to be obtained. In the Negro the disease is more frequently exudative, with involvement of the lymph nodes of the hilus, the chances for spread to the other lung by way of the lymphatics thus being greatly increased, even in the face of a good collapse.

Artificial pneumothorax therapy in this young age group is by far the method of choice. If the diagnosis is made early enough and, particularly, before the disease becomes bilateral, the end-results following immediate and successful collapse are good.

EUGENE SMITH, Ogden, Utah.

THE STABILITY OF THE COLONY MORPHOLOGY AND PATHOGENICITY OF BCG. DOROTHY M. BEHNER, Am. Rev. Tuberc. **31**:174 (Feb.) 1935.

In an attempt to develop a virulent substrain of the organism, Behner determined that BCG did not acquire virulence in laboratory culture on liquid mediums containing either normal human serum or homologous antiserum, in the depths of nutritive broth, by successive selection for propagation of smooth-appearing colonies on solid mediums or by repeated passage through animals. Such changes as the author produced in morphologic characteristics of the colonies were not accompanied by enhanced pathogenicity. The author reviews the literature pertaining to experimental work on BCG, especially the researches of the investigators who have arrived at conclusions at variance with her own.

EUGENE SMITH, Ogden, Utah.

THE LESIONS IN RABBITS FOLLOWING INOCULATION WITH BACILLUS CALMETTE-GUÉRIN (BCG). WILLIAM H. FELDMAN, Am. Rev. Tuberc. **31**:323 (March) 1935.

Glycerin-peptone-broth cultures of BCG were used for the inoculation of six rabbits intravenously and of four guinea-pigs subcutaneously. No lesions were observed in the guinea-pigs. In all the rabbits, however, striking focal lesions, morphologically like tubercles, were noted in the lungs. Acid-fast bacteria were readily demonstrable in sections of the lesions, but attempts to culture the organisms were futile. Emulsions prepared from the lesions failed to produce demonstrable lesions in other rabbits or guinea-pigs. Feldman, however, was unable to duplicate these results at a later date, using the same stock culture of BCG. His observations suggest that the organism "perhaps possesses a certain unpredictable instability which one would prefer not to associate with a state of innocuousness."

EUGENE SMITH, Ogden, Utah.

STUDIES IN TUBERCULOUS MENINGITIS WITH SPECIAL REFERENCE TO RACIAL SUSCEPTIBILITY. LEONIDAS H. BERRY, Illinois M. J. **67**:82 (Jan.) 1935.

In 505 of 3,835 autopsies performed at the Cook County Hospital from January 1929 to August 1932, the primary cause of death was tuberculous meningitis. From an analysis of these cases and a review of the literature, Berry concludes that there are no differences in the history, symptoms and physical and laboratory findings in tuberculous meningitis in Negro, white or Mexican patients. There are no consistent differences in the primary or associated pathologic features between the races in the respective age groups. There are definite and consistent differences between the associated pathologic lesions in children and those in adults, without respect to race. There is a much higher incidence of tuberculous meningitis in Negroes than in white patients in this series. In relation to the total number of autopsies performed, the incidence of tuberculous meningitis in Mexicans ranks highest, that in Negroes next and that in white persons lowest. There is evidence from an experimental community study and from other sources that there are differences in the incidence of tuberculosis within the Negro group which are just as great as differences between Negroes and white persons, and these differences may be explained entirely by environmental factors.

BARBOUR, Peoria, Ill.

THE MECHANISM OF TUBERCULIN HYPERSENSITIVENESS. J. H. HANKS, J. Immunol. **28**:105 (Feb.) 1935.

The author has confirmed and extended the observations of Dienes on the "delayed necrotic" tuberculin type of hypersensitive response to a foreign protein. If a protein, such as horse serum or egg white, is injected into a tuberculous lesion and this is followed in a week or ten days by the intracutaneous injection of the same antigen, a "delayed necrotic" type of reaction may occur rather than the immediate wheal or anaphylactic type. This reaction may occur early (in twenty-four hours) after setting up the tuberculous infection. The author was unable to obtain a similar response by injecting the protein into an "anatomic" tubercle produced by the previous injection of purified tubercle bacillus phosphatide.

FOTHERGILL, Boston.

TUBERCULOSIS IN CHILDHOOD. E. W. HANCOCK, Nebraska M. J. **20**:25 (Jan.) 1935.

The primary infection is usually in the parenchyma of the lung, with widespread dispersion of organisms to other parts of the body. This primary infection may result in only a mild illness. A quiescent stage follows the primary infection, which may persist throughout life. In a small percentage of cases reinfection occurs, and the adult type of tuberculosis is produced. Cutaneous tests and repeated roentgenograms, with examination of the entire family by the physician, are necessary. Primary infection makes possible all the other forms, and there is no evidence to prove that it confers any protection against tuberculosis.

HAMILTON, Omaha.

ACTINOMYCOSIS IN CHILDHOOD: A CLINICAL STUDY AND REVIEW. RICHARD W. B. ELLIS, Arch. Dis. Childhood **10**:1 (Feb.) 1935.

Actinomycosis, though rare throughout childhood, occurs even in early infancy. The disease is less uncommon in boys than in girls. In most instances Actinomyces bovis is thought to exist probably within the mouth or the gastro-intestinal tract and to become pathogenic when it gains entrance to the deeper tissues through an abrasion or area of lowered resistance of the mucosa. The clinical features of the commoner types of actinomycotic infection are described. The mouth provides the most frequent site of invasion, and next to this the cecum and appendix. Five illustrative cases of actinomycosis occurring in children are reported. In three of the instances the infection was of the abdominal type, with extension to the thorax, and in two, pulmonary. One of the last two patients is alive and shows improvement clinically and roentgenographically, two and one-half years after the onset of the disease. The postmortem observations in the other case are reported.

Treatment is unsuccessful in the majority of cases of abdominal and pulmonary infection in childhood. Iodides and iodine, as well as copper salts, have been used, with varying results. The use of insulin and dextrose has been advocated as an adjunct to other forms of treatment. In view of the chronicity of the disease, this may prove of value in stimulating appetite and preventing wasting.

KELLY, Milwaukee.

THREE CASES OF TUBERCULOSIS OF THE CENTRAL NERVOUS SYSTEM, FOLLOWED BY APPARENT CLINICAL RECOVERY. AGNES MACGREGOR, H. J. R. KIRKPATRICK and W. S. CRAIG, Edinburgh M. J. **42**:101 (March) 1935.

Three children with positive reactions to the tuberculin cutaneous test, without the classic evidences of meningitis and with only mild or transient nervous symptoms of any kind were subjected to lumbar puncture, and guinea-pigs were inocu-

lated with the fluid. Tubercle bacilli were recovered from the animals; none had been found directly in the human spinal fluid. The children recovered good health. The authors suggest that such cases may throw a different light on the pathogenesis of tuberculous meningitis, which has always been regarded as deadly.

NEFF, Kansas City, Mo.

MENINGEAL TUBERCULOSIS. WILLIAM BROWN, Edinburgh M. J. **42**:126 (March) 1935.

This issue of the *Edinburgh Medical Journal* is concerned with tuberculosis. Brown, a lecturer on the diseases of children at the University of Aberdeen, opens the discussion at the meeting of the Tuberculosis Society of Scotland, the transactions of which furnish the papers published in this number.

The author makes the interesting observation that the incidence of tuberculosis in the two sexes is the same until the age of 3 years, after which that in boys is higher. One third of the cases occur after the age of 3 years. Typing is more satisfactory than the use of two tuberculin injections to determine the human or the bovine nature of the infection. This makes it possible to prevent spread from the same source. The solution of the problem of bovine tuberculosis will be found in the examination of all cows as a routine.

NEFF, Kansas City, Mo.

MENINGEAL TUBERCULOSIS: SEASONAL, AGE AND SEX INCIDENCE. IAN M'CRACKEN, Edinburgh M. J. **42**:131 (March) 1935.

This physician of the department of public health in Glasgow, Scotland, summarizes some features of the mortality due to tuberculosis of the meninges in that city. The death rate has become reduced as the years go by; there were 29 per cent fewer deaths in 1933 than in 1900. The mortality from tuberculous meningitis for all ages was 6,006 in Glasgow for thirty years of this period, 90 per cent of these patients being less than 15 years of age and 65 per cent less than 5 years. Below the age of 4 years the incidence on the basis of sex is found to be about 5 per cent higher for boys, while in later childhood that for girls was somewhat higher. Overcrowding of houses or city wards has an effect on the incidence of tuberculous meningitis. The decrease in the mortality rate among young children has been somewhat balanced by an increase in the number of deaths in the older age groups. The season of greatest incidence is spring and early summer, following prevalence of acute infections of the respiratory tract in winter.

NEFF, Kansas City, Mo.

CEREBROSPINAL FLUID IN TUBERCULOUS MENINGITIS. J. GORDON CLARK, Edinburgh M. J. **42**:146 (March) 1935.

This paper reports certain observations in the cases at the Dundee Royal Infirmary during the preceding three years. The highest incidence was in the children's wards. Spinal punctures revealed from slight to great increases in pressure. A faint turbidity due to an increase in the cell count was seen on close inspection. The average count for children was 339 per cubic millimeter, ranging from 73 to above 500 (in only one instance) in the cases studied. Lymphocytes usually predominated, and the average count was 78 per cent. The serologic reaction to the colloidal gold chloride test usually was positive. Bacilli were demonstrated in only 50 per cent of the cases. In other cases the diagnosis was aided by finding clot formation, increased tension, slight turbidity and increase in the number of cells, with a range of from 100 to 150 cells per cubic millimeter and from 75 to 100 per cent lymphocytes.

NEFF, Kansas City, Mo.

MENINGEAL TUBERCULOSIS AS A TERMINAL FEATURE IN PULMONARY TUBERCULOSIS. C. CAMERON, Edinburgh M. J. **42**:154 (March) 1935.

Cameron, at the East Fortune Sanatorium, writes only of the occurrence of meningitis as a terminal factor. The figures show the higher incidence of meningitis in the earlier years of life, and in cases in which the disease exists in organs in addition to the lungs. Prodromal evidences may antedate the main onset by a considerable time. Such an occurrence is not rare. The average duration of the disease was sixteen days. In no case did recovery occur, all the patients having been severely ill with the pulmonary disease, which determines the prognosis.

NEFF, Kansas City, Mo.

RENAL TUBERCULOSIS: HISTOPATHOLOGY AND PATHOGENESIS. DAVID BAND, Edinburgh M. J. **42**:162 (March) 1935.

This communication is from the department of surgery of the University of Edinburgh. Of the thirty-one instances of renal tuberculosis only two were in children. Extrarenal tuberculous complications, when the infection was of the bovine type, greatly increased the mortality rate. Widely disseminated bovine infection is more deadly than the human type, but in localized lesions the latter is more deadly. The earliest lesions in the kidneys are the epithelial and mononuclear tubercles. Many of these bilateral primary lesions heal. Caseating foci ulcerate into the tubules. The open lesions of the cortex can be diagnosed if tubercle bacilli and pus cells are present in the urine from the kidney, even though changes are absent in the outline of the pelvis and calices shown in the pyelogram.

NEFF, Kansas City, Mo.

TUBERCULOUS MENINGITIS IN CHILDREN. J. W. S. BLACKLOCK and M. A. GRIFFIN, J. Path. & Bact. **40**:489, 1935.

Tuberculous meningitis is the most frequent form of meningitis in childhood and accounts for more deaths than all other forms of tuberculosis together. The primary site of infection in a series of 241 patients under 13 years was most frequently thoracic (73.9 per cent), then, in order, abdominal (22.8 per cent), cervical glandular (2.1 per cent) and unknown (1.2 per cent). There was little difference in the distribution according to sex, though meningitis following a primary thoracic lesion was slightly more frequent in girls and that following primary abdominal tuberculosis was commoner in boys. Of the total number of patients 85.5 per cent were under 6 years of age. The incidence was highest in the late spring and early summer months. The frequent association of tuberculous meningitis and general miliary tuberculosis is discussed; either lesion alone is uncommon. The methods used for isolating and typing tubercle bacilli from the cerebrospinal fluid are described. Human strains were easier to isolate directly by culture than bovine. In 1 case of infection with a human strain the inoculated guinea-pig gave a negative result, whereas the cultures were positive. From a clinical series of cases of cerebral tuberculosis 72 strains were isolated, of which 18.1 per cent were bovine, and from the primary lesions in an autopsy series 114 strains were obtained, of which 24.6 per cent were bovine. The highest percentage of bovine strains occurred in children in the third year of life in both series. The total percentage of bovine strains obtained for meningitis from both the aforenamed series was 22.5 and for all forms of cerebral tuberculosis, 22. This figure is compared with that found by other workers both in this country and abroad. A higher percentage of bovine infections was noted in country than in city children, and a probable reason for this is given. Meningitis following primary thoracic lesions was nearly always due to the human type of bacillus, and that following primary abdominal lesions was usually due to the bovine type. In 3 cases of meningitis with the primary lesions verified at autopsy bovine strains were isolated. A case

is described in which tubercle bacilli were isolated during life from the cerebrospinal fluid and in which tuberculomas were found post mortem but no meningitis. The bearing of this on the reported recoveries from tuberculous meningitis is discussed.

FROM THE AUTHORS' SUMMARY. [ARCH. PATH.]

THE MANTOUX TEST IN A GENERAL HOSPITAL POPULATION. G. GREGORY KANE, Lancet **2**:1333 (Dec. 15) 1934.

Four hundred and fifty-four patients were tested. They represented all ages; the preponderating proportion were past 45 years; the ratio of males to females was 10:9. A large number of the patients were of the "chronic" medical type; fifty-seven had clinical signs of tuberculosis (nine of these had nonpulmonary tuberculosis).

Each patient was first tested with a 1:10,000 dilution of tuberculin. The reaction was read after forty-eight hours. If the reaction was negative or doubtful the test was repeated with a 1:1,000 dilution of tuberculin. If the result was again negative or doubtful a third test with a 1:100 dilution of tuberculin was made.

The minimum reaction admitted as positive was a well defined erythematous area 10 mm. in diameter and slightly raised above the surrounding surface.

When the patients (clinically nontuberculous) of all age groups from 15 years on were grouped together, it was found that 35 per cent of the patients gave positive reactions with a 1:10,000 dilution of tuberculin, 74 per cent with a 1:1,000 dilution, and 86 per cent with a 1:100 dilution.

LANGMANN, New York.

DISSEMINATED LUPUS AND THERAPEUTIC PNEUMOTHORAX: RESULTS OF HELIOTHERAPY. P. F. ARMAND-DELILLE, C. LESTOCQUOY and CABESSA, Bull. Soc. de pédiat. de Paris **31**:434 (Nov.) 1933.

A boy, 15 years old, presented arrested pulmonary tuberculosis after pneumothorax treatment and healing lesions of lupus after heliotherapy.

BENJAMIN, Montreal, Canada.

RESULTS OF BILATERAL THERAPEUTIC PNEUMOTHORAX FOR ULCERATIVE TUBERCULOSIS OF THE LEFT LUNG AND INFILTRATION OF THE RIGHT: CURE AFTER FIVE YEARS OF TREATMENT. P. F. ARMAND-DELILLE and C. LESTOCQUOY, Bull. Soc. de pédiat. de Paris **31**:436 (Nov.) 1933.

The case of a girl, 14 years old, is reported. Five years before she had considerable destruction of the upper lobe of the left lung and subclavicular infiltration on the right side. She had fever and cough, and the washings of the stomach showed abundant tubercle bacilli. Treatment by means of artificial pneumothorax was begun on the left side, and this was followed a few months later by similar treatment on the right. The bilateral treatment was continued for three years without trouble. The temperature remained normal, and smears were negative for tubercle bacilli. Therefore treatment on the right side was stopped, but on the left it was continued for almost two years longer, after which the patient was considered cured.

BENJAMIN, Montreal, Canada.

OBSERVATIONS ON SYPHILIS OF THE PLACENTA. M. BRINDEAU and Y. MANOUÉLIAN, Bull. Soc. de pédiat. de Paris **31**:441 (Nov.) 1933.

The placenta of a 20 year old woman, delivered of a syphilitic infant, had the gross appearance of syphilitic involvement. It was studied histologically by a silver impregnation method for the identification of Spirochaeta pallida. The striking observation was made that the organisms were few in the placental tissue and in the blood but that in the walls of the tiny venules they were unusually plentiful, forming interlacing networks in places. While some of the spirochetes were typical

in morphologic characteristics, many showed various stages of change, assuming ringlet and crown shapes and losing the appearance of spirals. The organisms were chiefly seen in phagocytic cells. Spirochetes were also noted in the cutaneous lesions of the infant. Sections of the umbilical cord showed many organisms in Wharton's jelly, and although few could be seen in the blood which filled the vein, they occurred for the most part within phagocytes.

BENJAMIN, Montreal, Canada.

HISTOPATHOLOGIC OBSERVATIONS IN TUBERCULOUS MENINGITIS. LAIGNEL-LAVASTINE and A. F. LIBER, J. de méd. de Paris **55**:188 (Feb. 28) 1935.

A detailed description of the histologic observations in three cases of tuberculous meningitis is presented. The material does not lend itself to abstracting, but in general it can be said that the lesions in the meninges differ from those seen in other parts of the body in response to infection with the tubercle bacilli and that many of the lesions seem to be old, having probably been present long before the symptoms of tuberculous meningitis manifested themselves.

LESLIE, Evanston, Ill.

HEREDITARY TUBERCULOSIS AND MARRIAGE. A. LUMIÈRE, Progrès méd., Oct. 27, 1934, p. 1657.

The author warns against the marriage of tuberculous persons.

LESLIE, Evanston, Ill.

PHRENICECTOMY AND ITS MODE OF ACTION IN PULMONARY TUBERCULOSIS. J. IMBERT and R. HEIM DE BALSAC, Progrès méd., Oct. 27, 1934, p. 1658.

The authors call attention to the fact that phrenicectomy is beneficial not only because of its mechanical action in raising the diaphragm and immobilizing the lung but also because it increases the blood supply through action on the vasomotor nerves. This action explains the development of hemoptysis in certain cases after phrenicectomy. The authors also suggest alcoholization of the nerve instead of section, as in the first operation the action is temporary and full function may be restored to the lung after healing of the lesion. LESLIE, Evanston, Ill.

MYDRIASIS AND PUPILLARY RIGIDITY IN MOTHER AND SISTER WITH CONGENITAL SYPHILIS. G. PUGLISI-DURANTI, Arch. di ottal. **42**:1 (Jan.-Feb.) 1935.

The author could find only sixteen cases of this condition reported since 1900. It is to be distinguished from internal ophthalmoplegia by the fact that the ciliary muscle is unaffected. He reports two personal cases.

1. A boy of 12, whose mother had paresis, showed paralysis of the right side of the face, nystagmus, convergent strabismus and bilateral optic atrophy in addition to the pupilary condition. The spinal fluid gave a positive Wassermann reaction. The pupils were large, and there was no reaction to light or in accommodation. The orbicularis reaction was present on both sides. The pupils responded to atropine, cocaine and pilocarpine hydrochloride.

2. The boy's 9 year old sister showed slight bilateral ptosis, right convergent strabismus with amblyopia and an exactly similar pupillary condition. The Wassermann reaction of the spinal fluid was markedly positive. Accommodation was intact in both cases. The site of the pupilary lesion was apparently nuclear in both cases, though in the first case an accentuation of the orbicularis phenomenon suggests that the lesion may have been slightly above the nucleus, sparing the area mediating the orbicularis reflex. GIFFORD, Chicago. [ARCH. OPHTH.]

STUDIES IN VITRO OF SPECIFIC ANTIGEN IN THE URINE OF TUBERCULOUS CHILDREN. EUGENIO SCHWARZ and PAOLO MANFRINI, Pediatria **43**:153 (Feb.) 1935.

With the object of developing a test which could be of practical application in the diagnosis of tuberculosis, the authors undertook to study in vitro the antigen substances eliminated in the urine of tuberculous children. They employed the technic for the complement-fixation test and studied a series of patients between the ages of 3 and 12 years. Positive reactions were obtained in all cases in which the tuberculous process was advanced and active, while in those in which there was clinical progress toward recovery the reactions were uniformly negative.

The conclusion was reached that the results of the work possess great theoretical but no practical value.

SIGNORELLI, New Orleans.

INFLUENCE OF VARICELLA ON TUBERCULOSIS. VITALIANO SACCO, Pediatria **43**:177 (Feb.) 1935.

The work was prompted by a casual observation of the author during the routine operations of the outpatient clinic. In certain children in whom the reactions to cutaneous tests for tuberculosis had been positive, varicella developed, and on recovery from the latter disease it was found that uniformly the response to the Pirquet test became less marked or entirely negative.

The author undertook to study a series of thirty cases of varicella for the purpose of determining whether this response was purely coincidental. The series included fifteen children known to have tuberculosis and fifteen known to be free from the infection.

In only seven children of the tuberculous group (six with latent infection and one with active disease) was there reduction of the allergic reaction following varicella, and in each of these instances the reaction to the intradermal test and the general reaction to tuberculous infection persisted.

The author concludes that in his opinion varicella exhibits no influence on tuberculosis.

SIGNORELLI, New Orleans.

PSEUDOPARALYSIS OF PARROT. AMERICO AUGUSTO, Arch. de pediat., Rio de Janeiro **7**:240 (Feb.) 1935.

The child showed osteochondritis not only of the radius but also of the femur.

SANFORD, Chicago.

A PRACTICAL CASE. RINALDO DE LAMARE, Arch. de pediat., Rio de Janeiro **7**:291 (March) 1935.

The author describes a case of pseudoparalysis of Parrot in a child of 2 months.

SANFORD, Chicago.

SPONTANEOUS TUBERCULOUS PNEUMOTHORAX IN A CHILD. ALVIMAR DE CARVALHO, J. de pediat., Rio de Janeiro **2**:15 (Jan.) 1935.

Spontaneous total pneumothorax on one side and disseminated bronchopneumonia on the other developed in a patient of 5 months. The child's father died later of pulmonary tuberculosis. The bacilli were not found during life, because the condition was not suspected until just before death. Autopsy disclosed the lesions. The author believes that cases of this kind are more common than is usually supposed.

The most interesting factor in this case is that the child was vaccinated orally with Calmette's BCG vaccine on the seventh, ninth and eleventh days after birth. The author does not believe, however, that this in any way disproves the efficacy

of the vaccination against tuberculosis. There were factors in the environment that were too hard to overcome, namely, no vaccination until the second week of life (the usual rule in Brazil is vaccination of children within ten days of birth), complete absence of isolation either in the prevaccinal period or later and frequent mass contact.

SANFORD, Chicago.

CASE OF TUBERCULOSIS OF THE SKIN (SCROFULODERMA). J. RAMOS E SILVA, J. de pediat., Rio de Janeiro **2**:109 (March) 1935.

A child, aged 3 years, suffered from nodular cutaneous lesions in the axillary region, which broke down and ulcerated. The author judged them to be tuberculous on the basis of the intensively positive Mantoux reaction, with coexisting evidences of bilateral pulmonary hilar tuberculous lesions.

SANFORD, Chicago.

TUBERCULOUS PERITONITIS IN CHILDREN. WALTER PIAGGIO GARZÓN, Med. de los niños **36**:11 (Jan.) 1935.

A review of tuberculous peritonitis begins in the January number of this journal and is continued through several numbers. The condition is much more common in children than in adults, and especially in children between the ages of 6 and 12 years. In twelve of twenty-five cases forming the basis of this report, the disease developed during convalescence from measles. Tuberculous infection is likely to follow measles because of the lowered resistance and the changes that occur in the tracheobronchial glands, which make them more receptive to the invasion of the micro-organism. In the twelve cases the source of the infection, i. e., contact with tuberculous members of the family, could be traced, but in the remaining thirteen instances this source was not evident.

The onset is rarely sudden, but the author reports one case of sudden death from tuberculous peritonitis. The various forms of peritonitis are described, such as ascitic, plastic, fibrous and caseous and combinations of these forms. The diffuse form is more likely to be found in the nursing baby. The symptoms may be referable to the abdomen from the outset, but more often there is a period of fever, rapid pulse rate, anorexia and tracheobronchial adenopathy. In from about fifteen to twenty days abdominal symptoms appear. A typical case of this type is described, and the author states that it is impossible to diagnose the condition until abdominal symptoms are present.

DWYER, Kansas City, Mo.

TUBERCULOSIS OF THE PAROTID GLAND. DOMINIGOS GUILHERME DA COSTA, Rev. méd.-cir. do Brasil **43**:27 (Jan.) 1935.

The condition developed in a boy of 15 years, whose mother had died of tuberculosis. Since the age of 12 years he had attacks of irregular, unexplained fever. The swelling of the parotid had been present for some time. On the patient's admission to the hospital the parotid measured 6 by 4 cm. and was somewhat painful. It was removed by operation, and recovery was uneventful. Microscopic sections of the gland are shown.

SANFORD, Chicago.

LIPOID NEPHROSIS AND AMYLOIDOSIS IN PULMONARY TUBERCULOSIS. AMADEO REY, JUAN CARLOS REY and DONATO VÍVOLI, Rev. méd. latino-am. **20**:302 (Dec.) 1934.

The authors observed a patient with ulcerative, fibrocaseous pulmonary tuberculosis and a renal complication, lipoid nephrosis. The congo red test revealed amyloidosis of the spleen and adrenal cortex; this observation was corroborated at necropsy.

The authors find that the retention value of 40 per cent, considered by Bennhold to be positive proof of amyloidosis, is a little too high. Vivoli, who has had much experience with the congo red test and vital staining in amyloidosis, has observed that patients with amyloidosis of the spleen show a retention of between 15 and 20 per cent.

Thus, according to the authors, when from 15 to 20 per cent of the dye is present in the blood serum, one should always think of amyloidosis, especially of the spleen, because it generally develops in that organ first.

DWYER, Kansas City, Mo.

Internal Diseases

A CASE OF CONGENITAL COMPLETE HEART-BLOCK WITH LABILE VENTRICULAR RATE. HAROLD D. LEVINE, Am. Heart J. **10**:376 (Feb.) 1935.

A 12 year old boy with congenital complete heart block and probable defect of the interventricular septum was seen during an attack of acute tonsillitis. When he was first seen the pulse rate was 80 beats per minute. On the next day it fell to 60, then varied around 50 for several days, reached 37 on the seventh day and again rose to 80 on the eighteenth day, at which time the temperature was normal. The electrocardiogram showed complete heart block.

During convalescence the effects of epinephrine, atropine, exercise, vagal pressure, carotid sinus pressure and ocular pressure were studied. The ventricular, as well as the auricular rate, was accelerated after the administration of epinephrine and of atropine and following exercise.

The fact is emphasized that there are both vagal and accelerator mechanisms which can alter the ventricular rate in complete heart block.

GIBSON, Chicago.

VITAMIN "A" AS A PROPHYLACTIC AGAINST THE COMMON "COLD" IN GROUPS OF SCHOOL CHILDREN. ESTHER M. TRESS, Am. J. Digest. Dis. & Nutrition **1**:795 (Jan.) 1935.

Study of the Long Beach school children over a period of three years showed that the children who received cod liver oil or halibut liver oil had 27 per cent less absences, due to colds, from school. This study is not conclusive, because some of the children received the oil at school, while others were supposed to have received it at home. The study does show, however, that vitamin A added to the diets of the school children tended to increase their resistance to the common cold.

MORRISON, Savannah, Ga.

GROWTH OF DIABETIC CHILDREN. HENRY J. JOHN, Am. J. Digest. Dis. & Nutrition **1**:855 (Feb.) 1935.

This article brings out the fact that most diabetic children at the onset are above the normal standards of height, and as the disease progresses many of these children seem to fall below the normal standards. This drop in height is most marked between the ages of 13 and 16 years. A few patients fall into a group with the condition that may be called dwarfism. However, in John's group of one hundred children taken at large and over a period of years, nearly twice as many children were above the normal standard.

Further studies are necessary in order to determine whether this stunting in the growth in the later stages of diabetes in some children can successfully be combated by the use of the extracts of endocrine glands or whether the proper metabolic balance can be attained by proper nutrition and proper control of the diabetic condition alone.

MORRISON, Savannah, Ga.

A Ganglioneuroma in the Neck of a Child. J. MacFarland and S. W. Sappington, Am. J. Path. **11**:429, 1935.

The case described is that of a well characterized ganglioneuroma. In this tumor, however, nerve cells in all stages of development from neuroblasts to ganglion cells occurred, and among them was a stroma made up of Schwann cells and nerve fibers. It occurred in the neck of a little girl, and the case seems to be the twelfth of its kind to be placed on record. Three years after operative removal the patient is living, with no return of the tumor and no metastases. Appended to the article are one hundred and forty-three references to the literature.

From the Authors' Summary.

The Direct Development of Hookworms After Oral Infection. A. O. Foster and S. X. Cross, Am. J. Trop. Med. **14**:565 (Nov.) 1934.

Foster and Cross review briefly the literature on the migration of the bookworm larva. They performed experiments to determine whether it was necessary for the larva to pass through the lungs in order to be able to survive and develop normally in the intestine of the host. They experimented with dogs and the Ancylostoma caninum. From their studies they concluded that the journey through the lungs was not necessary for the development of Ancylostoma caninum and that larvae of Ancylostoma caninum administered orally to the susceptible normal host usually do not migrate but develop directly in the intestine.

Burpee, Augusta, Ga.

The First Fatal Case of Chagas' Disease Observed on the Isthmus of Panama. Elbert DeCoursey, Am. J. Trop. Med. **15**:33 (Jan.) 1935.

DeCoursey reviews briefly the literature on this disease and describes the parasite, its life cycle and the symptoms of the disease. He also reports a case in a 3 month old Negro, with postmortem findings. He states that the outstanding lesions were in the heart and in the brain. Trypanasoma Cruzi in its leishmania form was numerous in the myocardium and sparse in the brain and caused severe diffuse myocarditis and widespread focal encephalitis.

Burpee, Augusta, Ga.

Human Intestinal Myiasis Due to the Larvae of Soldier Fly, Hermetia Illucens Linné (Diptera, Stratiomyidae). Henry E. Meleney and Paul D. Harwood, Am. J. Trop. Med. **15**:45 (Jan.) 1935.

Meleney and Harwood report the case of a boy with intestinal myiasis due to the larvae of the "soldier fly," Hermetia illucens Linné.

A description of the larvae and adult fly is given. The larvae caused symptoms of local irritation in the stomach and rectum and fainting spells. The authors state that this is apparently the second case in a human being to be reported and that the condition is probably acquired by eating raw fruit or vegetables on which the eggs of the fly have been deposited.

Burpee, Augusta, Ga.

The Roentgen-Ray Appearance of the Lung Field in Atelectatic Bronchiectasis. Richard H. Overholt, Am. Rev. Tuberc. **31**:121 (Feb.) 1935.

Evidence of bronchiectasis affecting the lower lobe of the left lung may be seen in the plain roentgenogram as secondary effects produced in the upper lobe. These appear as differences in density of the pulmonary fields (indicating distention of the upper lobe on the affected side) and as an inequality in the position of the diaphragm, which is best seen in the lateral roentgenogram. When in the ordinary postero-anterior and lateral views distention of the upper lobe and elevation of the posterior leaf of the diaphragm are seen, atelectatic bronchiectasis of the lower lobe may be suspected.

Eugene Smith, Ogden, Utah.

TREATMENT FOR THE PRIMARY MYOPATHIES. HANS H. REESE, E. MURRAY BURNS and CAROL M. RICE, Arch. Neurol. & Psychiat. **33**:19 (Jan.) 1935.

The authors discuss the rationale and clinical results of the treatment of the primary myopathies. They emphasize the fact that the primary myopathies are characterized by alterations in the metabolism of creatinine. Patients with true myopathies excrete all the ingested creatinine. An increased output of creatinine is also obtained by giving amino-acetic acid. Creatinine is formed from or by amino-acids. The formation of creatinine depends in part at least on the storage of amino-acetic acid. Amino-acetic acid is either not utilized or is stored in the dystrophic muscles. For this reason, and by reason of clinical results, treatment with this substance is beneficial.

BEVERLY, Chicago.

HODGKIN'S DISEASE. EDITH LOUISE POTTER, Arch. Path. **19**:139 (Feb.) 1935.

This study is based on thirty-eight cases of Hodgkin's disease with complete autopsy material, fifty cases of Hodgkin's disease diagnosed from lymph nodes removed surgically and ninety-two cases in which the lymph nodes showed diseases other than Hodgkin's disease. The pathologic differentiation of Hodgkin's disease from other diseases of the lymph nodes was studied. The conclusion is that the only specific feature of Hodgkin's disease is the Hodgkin cell and that in its absence a positive diagnosis cannot be made. Other features, such as loss of structure of the node, invasion of the capsule, hyperplasia of the reticulum cells, increase in the number of eosinophils and plasma cells and decrease in the number of lymphocytes, may occur in other diseases of the lymph nodes.

LEMASTER, Evanston, Ill.

THE ELECTROCARDIOGRAM IN CHILDREN WITH MILDER DEGREES OF CHRONIC RHEUMATIC HEART DISEASE. ELIZABETH BRAKELY, Arch. Pediat. **51**:749 (Dec.) 1934.

A study was made of one hundred consecutive children attending the clinic for heart disease of Mountainside Hospital, Montclair, N. J. Many of the children had been sent to the clinic because heart murmurs had been discovered during the course of routine examination by school physicians or in health clinics. Some of the children gave a definite history of rheumatism, recurring growing pains or frequent attacks of sore throat, and physical examination revealed definite organic cardiac lesions. In many cases, however, no history of rheumatism could be elicited, and only faint systolic murmurs were heard over the base of the apex. The object of the investigation was to ascertain whether electrocardiograms of these patients compared with those of patients with clearcut rheumatic heart disease would give any added information not furnished by physical examination, thereby proving an aid in diagnosis.

Brakely found that among children with milder degrees of rheumatic heart disease and those with so-called functional systolic murmurs the electrocardiogram differed a little from that for normal children, but added no information which could not be obtained by physical examination. WADDELL JR., University, Va.

FOREIGN BODY IN THE APPENDIX: REPORT OF CASE. DAVID LAZARUS, Arch. Pediat. **51**:802 (Dec.) 1934.

The case of a foreign body found in the appendix at the time of operation is reported. In this instance the foreign body proved to be a straight pin.

WADDELL JR., University, Va.

PERICARDIAL EFFUSION OF RHEUMATIC ORIGIN: DIAGNOSIS AND TREATMENT. LEON ANTELL, Arch. Pediat. **52**:1 (Jan.) 1935.

Antell reports on a study undertaken to investigate facts pertinent to the diagnosis of pericardial effusion and various methods of therapy. This study is based on nine cases and offers nothing new as regards the present knowledge of this subject.

WADDELL JR., University, Va.

NEW CONCEPTIONS OF THE ORIGIN AND FREQUENCY OF COLDS IN CHILDREN. J. A. HAIMAN, Arch. Pediat. **52**:90 (Feb.) 1935.

Nothing new.

B. COLI SEPTICEMIA COMPLICATING PYONEPHROSIS DUE TO BILATERAL CONGENITAL URETERAL STRICTURES. GEORGE J. FELDSTEIN, Arch. Pediat. **52**:111 (Feb.) 1935.

A case of septicemia due to Bacillus coli complicating pyonephrosis due to bilateral congenital strictures is reported. Feldstein calls especial attention to a type of acute pyuria of apparent sudden onset and rapidly developing toxic or uremic symptoms in infants or children who have had no evidence of previous illness.

The question of septicemia due to B. coli is discussed, and the pathologic changes, treatment and diagnosis of congenital ureteral stricture and its complications are reviewed. Emphasis is again placed on the fact that infants and children are subject to practically all the various urologic conditions found in adults and require the same sort of urologic treatment and surgical procedure.

WADDELL JR., University, Va.

VAGINAL FOREIGN BODIES IN CHILDREN: A SIMPLIFIED METHOD OF REMOVAL. REPORT OF THREE CASES. SAMUEL K. LEVY, Arch. Pediat. **52**:186 (March) 1935.

Three cases of foreign bodies in the vagina are reported, with a description of the author's method of removal by instruments designed by him.

WADDELL JR., University, Va.

THERAPEUTIC USE OF CONCENTRATED ANTISTREPTOCOCCUS SERUM OF NEW YORK STATE DEPARTMENT OF HEALTH IN CRYPTOGENIC STREPTOCOCCEMIA AND OSTEOMYELITIS OF CHILDREN. ADELE E. SHEPLAR, MARTHA JANE SPENCE and WARD J. MACNEAL, Arch. Surg. **29**:1069 (Dec.) 1934.

Five children under 5 years of age with generalized metastatic infection without a clinically recognizable portal of entry were treated with antistreptococcus serum. Two of the five patients recovered. The plea is made for early administration of serum if it is to be used at all.

KAISER, Rochester, N. Y.

THE IRON OF THE BLOOD: A COMPARISON OF VALUES FOR HEMOGLOBIN DETERMINED BY THE NEWCOMER METHOD AND CALCULATED FROM THE IRON CONTENT. HUGH W. JOSEPHS, Bull. Johns Hopkins Hosp. **56**:50 (Jan.) 1935.

Josephs compares these two methods in subjects other than normal. He found that the hemoglobin calculated from the iron content of the whole blood tends to be higher than that determined by the Newcomer method, in some cases markedly so.

LYTTLE, New York.

TWO CASES OF CHILDHOOD MYXEDEMA, REPORTED FOR THE PURPOSE OF EMPHASIZING THE IMPORTANCE OF BONE-AGE STUDIES. C. KELLY CANELO and H. LISSER, Endocrinology **19**:21 Jan.-Feb.) 1935.

When retardation in osseous development is found the following conditions must be kept in mind in making a differential diagnosis:

1. Myxedema of the childhood type, in which there is delay both in appearance of bone nuclei and in epiphyseal union.

2. Hypophyseal infantilism, in which delay is not as striking as in primary thyroid failure.

3. Preadolescent eunuchism, in which the sex glands are either absent or deficient, which is characterized by pronounced lateness of epiphyseal closure.

In addition, there is a group of developmental abnormalities for which an endocrine causation has not been proved:

4. True infantilism (Falta) in which the patient retains childish skeletal dimensions, childish genitalia and a childish psyche. The endocrine system participates in but does not originate this condition.

5. Primordial dwarfism, in which the infant is dwarfed at birth. Osseous development proceeds normally; the individual matures sexually and intellectually but remains dwarfed.

6. Paltauf's dwarfism, in which the infant is normal at birth, suddenly ceases to grow in youth and later in life may suddenly start to grow again. The development of the genitalia and of the secondary sex characteristics is retarded; the growth of bone nuclei is retarded, and epiphyses may remain open into late adult life.

7. Rachitic dwarfism, in which one can always find evidence of previous rickets.

8. Achondroplastic dwarfism, in which ossification of epiphyses may vary. The intellectual and sexual development is normal. The extremities are disproportionately short.

9. Mongolian idiocy, in which there is usually some stunting of growth, with slight delay in the appearance of bone nuclei, but no delay in epiphyseal closure. The condition is readily recognized by the other characteristics.

The authors report two cases of myxedema of the childhood type with markedly retarded bone age. One patient, a girl of 12, had an ossification age of 1 year, which was readily ascertained, whereas the basal metabolism was impossible to determine. Both patients showed remarkable improvement with thyroid therapy. JACOBSEN, Buffalo.

DIAGNOSIS AND TREATMENT OF INFECTION OF THE UROGENITAL TRACT IN CHILDHOOD. ISAAC A. ABT, Illinois M. J. **66**:521 (Dec.) 1934.

Abt relates in his own inimitable manner a historical and bibliographic sketch of the pioneers in the work of and the early literature on pyuria. Some of his personal experiences with and views on the etiologic factors, symptomatology and treatment of this symptom complex are presented. He points out particularly the variability of the symptoms and emphasizes that in cases in which medical treatment of every kind is of no avail or in which there are frequent recurrences with fever a urologic consultation should be called. BARBOUR, Peoria, Ill.

ALLERGIC DISEASES IN CHILDHOOD. W. L. CRAWFORD, Illinois M. J. **66**:535 (Dec.) 1934.

In this article Crawford enumerates the various allergic disorders and outlines the present popular methods of skin testing and methods of treatment in the handling of these cases. He has nothing new to offer. BARBOUR, Peoria, Ill.

FETAL PERITONITIS IN A PREMATURE INFANT. GEORGE L. DAVENPORT and SAMUEL L. GOLDBERG, Illinois M. J. **66**:563 (Dec.) 1934.

Davenport and Goldberg report a case of fetal peritonitis with intestinal obstruction as the result of adhesions. The patient was operated on when a few days old and made an uneventful recovery.

BARBOUR, Peoria, Ill.

PEPTIC ULCER IN CHILDHOOD. JAMES B. GILLESPIE and CESARE GIANTURCO, Illinois M. J. **67**:160 (Feb.) 1935.

In this article the authors report a case of peptic ulcer in childhood and review the literature on the symptoms, diagnosis and treatment.

BARBOUR, Peoria, Ill.

NON-DIPHTHERITIC MEMBRANOUS INFECTION OF THE LOWER RESPIRATORY TRACT IN CHILDREN. WALTER M. WHITAKER and WALTER STEVENSON, Illinois M. J. **67**:167 (Feb.) 1935.

Whitaker and Stevenson report a small group of fatal cases characterized by a descending infection of the lower respiratory tract, of nondiphtheritic origin. They believe that present-day methods of therapy are futile to save these children and that direct laryngoscopic examination is invaluable in the differential diagnosis of this condition.

BARBOUR, Peoria, Ill.

THE EFFECT OF LOW RELATIVE HUMIDITY AT CONSTANT TEMPERATURE OF POLLEN ASTHMA. B. Z. RAPPAPORT, TELL NELSON and WILLIAM H. WELKER, J. Allergy **6**:11 (Jan.) 1935.

Patients subject to pollen asthma obtained definite relief when kept in a room in which the air was filtered and the humidity and temperature kept constant. There was a delayed onset of symptoms after a storm when the humidity in the room ranged from 15 to 40 per cent and the temperature ranged between 72 and 82 F.

A concentration of ozone in the room considerably greater than that in the air after an electrical storm caused no beneficial or detrimental effects.

HOYER, Cincinnati.

MERCURIAL STOMATITIS. J. R. MCGEORGE, J. Am. Dent. A. **22**:60 (Jan.) 1935.

This is a brief article on the clinical aspects of the disease, in which the symptoms are well enumerated. The importance of oral hygiene as a prophylactic measure at the time of mercurial medication is emphasized. A short outline of the treatment is supplied. Therapeutic agents include potassium permanganate in a 1:1,000 solution, iodoform in glycerin, boric acid packs and sodium thiosulfate.

NOYES, Chicago.

A MODIFIED TECHNIC FOR STERNAL PUNCTURE AND ITS VALUE IN HEMATOLOGIC DIAGNOSIS. CARL REICH, J. Lab. & Clin. Med. **20**:286 (Dec.) 1934.

Reich describes the use of a new needle for bone marrow puncture. The method of examining the marrow is described; normal values are given, and three cases are discussed which show the value of this method of diagnosis in suspected dyscrasias of the blood.

MCMURRAY, Galveston, Texas.

SIMPLE APPARATUS FOR KEEPING CITRATED BLOOD WARM DURING INJECTION. LEONARD HEDDICK, J. Lab. & Clin. Med. **20**:321 (Dec.) 1934.

A simple apparatus is described which can be used to keep blood or any other solution warm during intravenous injection. The articles required for its construction are readily available in any laboratory.

MCMURRAY, Galveston, Texas.

PNEUMONIA—A SHORT CLINICAL PICTURE. WILLIAM M. DONALD, J. Michigan M. Soc. **34**:17 (Jan.) 1935.

Donald reports the case of a child aged 7, acutely ill but with no symptoms except fever, vomiting, constipation and a white cell count of 24,400. Roentgen examination on the fifth day of the illness showed a pneumonic process in the apex and middle lobe of the right lung.

CAREY, Detroit.

A STUDY OF FORTY CASES OF PERSISTENT PYURIA. PEARL SUMMERFELDT and ALAN BROWN, J. Pediat. **5**:727 (Dec.) 1934.

Forty children with persistent pyuria were studied with special regard to intravenous pyelograms and cystoscopic examinations. In every case obstruction was found somewhere in the urinary tract. Treatment was aimed primarily to relieve the urinary obstruction. In a few instances the ketogenic diet produced excellent results.

LEMASTER, Evanston, Ill.

AMEBIASIS IN CHILDREN. SAMUEL J. NICHAMIN, HENRY G. PONCHER and MARION HOOD, J. Pediat. **5**:741 (Dec.) 1934.

Six cases of amebiasis in children are reported. In each instance there were vague gastro-intestinal symptoms, and the amebic cysts were found only after repeated examinations. The literature on amebiasis in children is briefly reviewed. It is suggested that repeated examinations of the stool for parasites be made in children who show vague and unexplained gastro-intestinal disturbances.

LEMASTER, Evanston, Ill.

AMEBIC ABSCESS OF THE LIVER. LEWIS K. SWEET, J. Pediat. **5**:750 (Dec.) 1934.

A Chinese girl, 5 years old, was admitted to the hospital with a large amebic abscess of the liver. Two months previously she had had an attack of diarrhea. Repeated aspirations of the abscess cavity and the hypodermic use of emetine hydrochloride U. S. P. caused rapid recovery. This case is reported because amebic abscess of the liver in children is rare.

LEMASTER, Evanston, Ill.

ACUTE INFECTIOUS CROUP: III. CROUP ASSOCIATED WITH SPECIFIC DISEASES. A. HARRY NEFFSON and SAMUEL M. WISHIK, J. Pediat. **5**:776 (Dec.) 1934.

Neffson and Wishik discuss the manifestations and treatment of croup occurring with measles, scarlet fever, pertussis and varicella. There are also reports of cases of respiratory obstruction due to tetany, poliomyelitis, papilloma of the larynx, foreign bodies, retropharyngeal abscess, lymphosarcoma, mucous plugs, dried blood clots, agranulocytosis, fungus infection and Vincent's angina. The summary and conclusions for parts I, II and III are given.

LEMASTER, Evanston, Ill.

AURICULAR FIBRILLATION AS AN EARLY TOXIC DIGITALIS MANIFESTATION. ABRAHAM JEZER and SIDNEY P. SCHWARTZ, J. Pediat. **5**:811 (Dec.) 1934.

Two cat units of digitalis was given daily to seven children with congestive heart failure due to rheumatic heart disease. In two of the children auricular fibrillation occurred as a toxic effect of digitalis and stopped soon after digitalis was discontinued. In only one instance did nausea and vomiting precede the fibrillation. Jezer and Schwartz state that they have repeatedly observed the failure of digitalis therapy and the successful use of diuretic measures in children with moderate congestive heart failure.

LEMASTER, Evanston, Ill.

FLUOROSCOPICALLY CONTROLLED ENEMA REDUCTION OF INTUSSUSCEPTION. E. D. HUNTINGTON and R. E. WILLIAMS, J. Pediat. **5**:819 (Dec.) 1934.

A case of intussusception reduced by enemas of barium sulfate is reported. Huntington and Williams believe that this procedure is intelligent, scientific, safely conservative and analogous to the conservative and proper conduct of labor, as compared to routine abdominal section. No anesthetic is necessary. Under the fluoroscope it can be determined definitely whether or not complete reduction has been accomplished. In event of failure by this method the usual surgical treatment can be performed.

LEMASTER, Evanston, Ill.

CELIAC DISEASE. JULIUS H. HESS and OTTO SAPHIR, J. Pediat. **6**:1 (Jan.) 1935.

Three cases of celiac disease with observations at autopsy are reported. The postmortem observations of other authors are also discussed. In all three cases reported here there were recent bronchopneumonia with large fat-filled monocytic cells in the lungs, chronic enteritis and marked histologic alterations in the pancreas. The pancreatic picture consisted of fibrosis, dilatation of the ducts, diffuse lymphocytic infiltration and definite evidence of regeneration of pancreatic tissue. The wastage of fat and the disturbance in carbohydrate metabolism is attributed to the pathologic condition of the pancreas.

LEMASTER, Evanston, Ill.

HEMORRHAGE AND SUBSEQUENT CALCIFICATION OF THE SUPRARENAL. CHARLES E. SNELLING and I. H. ERB, J. Pediat. **6**:22 (Jan.) 1935.

The material for this study was derived from the records of forty-three infants and children in whom hemorrhage of the adrenal gland was noted at autopsy. In some cases shock and collapse were the outstanding symptoms; in other cases hyperirritability was pronounced. In older children, hemorrhage of the adrenal gland was found to be due in most cases to infections, such as septicemia, nephritis and meningitis. Fifteen of the forty-three cases were those of new-born infants. Among seven cases in which death was due to an intercurrent disease other than the hemorrhage of the adrenal gland, calcification was present in six and fibrosis in one.

LEMASTER, Evanston, Ill.

THE OCCURRENCE OF BLOOD-FILLED CYSTS ON THE CARDIAC VALVES IN INFANCY. STEPHEN D. MILLS, J. Pediat. **6**:51 (Jan.) 1935.

In the postmortem examinations of seventy-two new-born infants, small blood-filled cysts were found on the cardiac valves in twenty-three—an incidence of 32 per cent. These cysts seem to be cystic dilatations at the ends of endothelial-lined canals in the substance of the valves. In the majority of infants these cysts disappear by the third month of extra-uterine life.

LEMASTER, Evanston, Ill.

GONORRHEAL VAGINITIS IN CHILDREN TREATED BY DIATHERMY. ROBERT J. CROSSEN, J. Pediat. **6**:82 (Jan.) 1935.

Good results were obtained in the treatment of gonococcic vaginitis by the use of diathermy. In this method an electrode is placed in the vagina and the temperature raised to 112 F. The best results were seen in cases of chronic infection. Crossen believes that the use of diathermy is far superior to antiseptic preparations in this condition.

LEMASTER, Evanston, Ill.

CONTINUOUS INTRAVENOUS THERAPY IN INFANTS. JOHN E. ASHBY and HUGH LESLIE MOORE, J. Pediat. **6**:88 (Jan.) 1935.

The advantages of the continuous intravenous administration of fluids in pediatric practice is discussed. Ashby and Moore prefer to use a very small

needle and select a small vein in the scalp in infants. The details of the technic used by the authors in 511 cases are described.

LEMASTER, Evanston, Ill.

DISORDERS OF INTESTINAL GLAND SECRETION IN CHILDREN. FRITZ B. TALBOT, J. Pediat. **6**:102 (Jan.) 1935.

In this critical review the recent literature concerning the endocrine glands in children is discussed under the following headings: thyroxine, iodine, hyperthyroidism, the parathyroids, the pituitary gland, pituitary headache, undescended testes, the adrenal cortex and hyperinsulinism.

LEMASTER, Evanston, Ill.

ACUTE NEPHRITIS IN CHILDREN. R. M. POLLITZER, J. South Carolina M. A. **30**: 239 (Dec.) 1934.

Five cases of acute nephritis are reported, and the treatment in each case is described:

In the cases with uremia a 2 per cent solution of magnesium sulfate was given intravenously or a stronger solution intramuscularly. In cases in which there is edema it does not act as a purgative but does reduce the blood pressure. Quantities of water were given, as much as from 1 to 5 quarts (946.4 to 4,731.8 cc.) a day.

In selected cases a limited soft diet was given. Diuresis was obtained by intravenous injections of dextrose, but this is not advised unless indicated.

WESTON JR., Columbia, S. C.

THE MANAGEMENT OF CHILDREN WITH RHEUMATIC HEART DISEASE: REPORT OF FOUR CASES. EDWARD F. BLAND and PAUL D. WHITE, M. Clin. North America **18**:1067 (Jan.) 1935.

Rheumatic fever, which is responsible for most of the disabling heart disease of childhood, is a disease of as yet undetermined etiology, essentially chronic and usually characterized by repeated recrudescences or recurrences. It is during this active stage of the infection that structural alterations occur in the heart, and their subsequent progression is dependent on continued activity or recrudescence of the disease. An important fact to be borne in mind is that in childhood active rheumatic disease may exist below the threshold of clinical recognition. Poor general health with loss of weight and appetite, vague pains in the muscles or joints, unexplained nosebleeds and persistent rectal temperature of from 100 to 101 F. must be viewed with suspicion. In addition, mild leukocytosis, an increased red cell sedimentation rate or an abnormally long auriculoventricular conduction time would tend to confirm the suspicion of active rheumatic disease.

Apical murmurs, whether systolic or mid-diastolic, may be due either to valvular disease or to dilatation of the left ventricle. When either occurs within a few days or weeks after the onset of an acute rheumatic infection, ventricular dilatation and not valvular deformity is most likely to be the cause. If, however, these murmurs persist and are found months or years afterward, organic valvular deformity is present. It is now certain that months or years are required for the establishment of organic mitral stenosis.

Once active rheumatic disease is recognized, absolute rest in bed until all clinical and laboratory signs of activity have subsided is imperative. Salicylates are indicated only for the relief of pain, since they probably depress the protective mechanisms of the body. In the treatment of congestive failure in children, digitalis is unsatisfactory. The most effective drugs seem to be the diuretics, such as theobromine sodiosalicylate or the mercurial diuretics, given intravenously, when there are nausea and vomiting. When active disease has subsided, even though structural damage to the heart remains, the child should be carefully guided to a more active life. The outstanding factors on which to determine the regimen to be recommended are: (1) the size of the heart and (2) the degree

of functional limitation of cardiac reserve as expressed largely by the single symptom of breathlessness on exertion. When no evidence of active infection or of functional limitation of cardiac reserve remains and there is only slight enlargement, normal active life with minimal restrictions may be gradually resumed. In general, it is a mistake seriously to limit the activities of any child with rheumatic heart disease on the basis of cardiac murmurs alone.

SMITH, Ogden, Utah.

RHEUMATIC HEART DISEASE IN EARLY CHILDHOOD. JAMES ALEXANDER LYON, New England J. Med. **211**:1185 (Dec. 27) 1934.

After discussing the literature on the subject Lyon describes the clinical, pathologic and electrocardiographic studies in four cases with various significant phases of rheumatic heart disease.

CASE 1.—A boy, aged 4 years, was admitted to the hospital with a history of having been "ill off and on" for two months. The heart was enlarged in all diameters. There were a diastolic and a systolic murmur at the apex. A systolic murmur in the aortic area was also present. Advancing signs and symptoms of congestive failure and of massive pericardial effusion rapidly developed and the patient died two months after admission. Six days before death occurred an electrocardiogram was taken which demonstrated complete auriculoventricular dissociation. An autopsy was not permitted.

CASE 2.—A girl, aged 7 years, was admitted with a history of pyrexia, coughing and acute pain in the joints and epigastrium, of two weeks' duration. She had had a similar attack two months previously. The heart was enlarged in all diameters. A systolic and a diastolic murmur were present at the apex. The child improved rapidly and was discharged two weeks after admission.

During the following four and a half years the patient had recurrent attacks of rheumatic arthritis with pyrexia. One year following her second discharge she was readmitted. An electrocardiogram taken the following day showed a split and rounded P wave in leads I and II, suggestive of involvement of the auricles. There was also a notching of the descending limb of the R wave in lead I. At this time the patient was showing clinical signs and symptoms of advanced congestive failure. After a two months residence in the hospital she was discharged. Six months later she was readmitted and on the following day she died. An electrocardiogram demonstrating auricular fibrillation and inversion of the T wave in lead I was taken two hours before death. Observations at autopsy confirmed the diagnosis.

CASE 3.—A boy, aged 9 years, was admitted with a history of attacks of vomiting over a period of six weeks just prior to admission. He was dyspneic and orthopneic. The heart was enlarged in all diameters. A systolic murmur was present at the apex. Ascites was present. The patient improved and was discharged from hospital three months after admission. Five months later he was again admitted because of coughing, dyspnea and ascites. There were dulness and moist râles in both lungs. The liver was enlarged. An electrocardiogram demonstrated an auriculoventricular rate of 80 beats per minute, with premature bigeminal ventricular contractions. The child improved rapidly and was discharged one month after admission.

CASE 4.—A girl, aged 4½ years, was admitted to the hospital with a history of sore throat, coughing, restlessness and pyrexia, of one month's duration. On admission she was dyspneic and orthopneic. The heart was enlarged in all diameters. A systolic murmur was present at the apex. The liver was enlarged. One year later she was readmitted because of attacks of coughing and vomiting, of two weeks' duration. A systolic and a diastolic murmur were present at the apex. A pericardial friction rub was noted. Six months after discharge she was again admitted with signs of advancing cardiac incompetency. She was digitalized. At autopsy examination of the pericardial sac showed a parietal layer firmly adherent to the visceral layer.

GENGENBACH, Denver.

THE PATHOLOGY OF MILK ANEMIA. EMMERICH VON HAAM, South. M. J. **28**:22 (Jan.) 1935.

The author studied the pathologic changes in albino rats suffering from anemia due to a diet of goat's milk and one of cow's milk. Hypertrophy of the heart muscle, atrophy of the spleen and fatty degeneration of the liver were the most characteristic gross anatomic features. Microscopic study confirmed the gross pathologic observations and showed as the only differential diagnostic sign between both types of anemia a disturbance of leukopoiesis in the animals fed goat's milk.

The pathologic findings in anemia due to goat's milk are not similar to the pathologic findings in pernicious anemia in man, and any near relationship between both types of anemia has to be denied.

SCHLUTZ, Chicago.

THE IMPORTANCE OF IMMATURE WHITE BLOOD CELLS IN DISEASES OF CHILDREN. W. AMBROSE MCGEE, South. M. J. **28**:43 (Jan.) 1935.

McGee believes that a study of the immature white blood cells gives much information relative to diagnosis and treatment. Repeated smears are of more value than a single one, and they greatly reduce the need for a total white count. Changes in the number of neutrophils frequently indicate progress or a relapse ahead of the total white count, fever and symptoms.

Information obtained from the study of immature polymorphonuclears and other white cells should be used in collaboration with symptoms and clinical findings, but an outstanding blood picture (especially with a high shift of percentage to the left) should not be ignored, even in the absence of clinical symptoms and signs.

The percentage of immature polymorphonuclears indicates the degree of severity of the infection: the higher the shift, the more severe the infection. The ratio between the lymphocytes and monocytes gives an approximate index of the degree of resistance.

In childhood the blood picture is composed largely of lymphocytes, which give no great amount of information relative to the acuteness of an infection. By dividing the neutrophils into four groups one has a method of learning a great deal about the acuteness and the severity of the infection.

SCHLUTZ, Chicago.

THE HAEMATOLOGY OF INFANTILE SEPSIS. PAULINE KLENERMAN, Arch. Dis. Childhood **9**:343 (Dec.) 1934.

Six cases of infantile septic manifestations, such as cutaneous infections, otorrhea, gastro-enteritis and pyuria, occurring soon after birth up to the end of the first year are reported.

The hemoglobin was not reduced to any appreciable degree. The color index was between 0.8 and 0.9; red cells numbered from 3,500,000 to 4,500,000 per cubic millimeter, with between 1 and 2 per cent reticulocytes. The white cells varied from 8,000 to 15,000 or 16,000 per cubic millimeter, and the differential count in all cases showed a preponderance of immature forms, with very few segmental or mature polymorphonuclears in the neutrophil series. In three of six cases fully investigated there was a decrease in the shift to the left and an increase in lymphocytes and eosinophils during the final phase of recovery. In others the findings varied.

KELLY, Milwaukee.

POLLEN SENSITIVENESS IN CHILDREN WITH ASTHMA. R. BRUCE PEARSON, Arch. Dis. Childhood **9**:353 (Dec.) 1934.

Two hundred and fifty cases of asthma were investigated. Intradermal tests were carried out on 210 of the patients with a mixed pollen extract and a control solution of buffered phosphate. In addition, 141 were tested with a dust extract.

Of the 250 children who were tested, 42 per cent gave positive intradermal reactions to grass pollen extract. Of those whose symptoms were more intense during the summer months, 61 per cent were sensitive, compared with 32 per cent of the remainder. Examination of those who had or had had eczema gave a higher proportion of reactors than in any other group, except for the occasional patient whose asthma had developed after, and apparently as a direct result of, hay fever.

Treatment of pollen-sensitive asthmatic persons by the injection of pollen extract with or without extracts of other common allergens is a reasonable procedure which is likely to be followed by a decrease in the frequency and severity of the attacks.

KELLY, Milwaukee.

IRON-DEFICIENCY ANEMIA IN CHILDREN: ITS ASSOCIATION WITH GASTRO-INTESTINAL DISEASE, ACHLORHYDRIA AND HAEMORRHAGE. J. C. HAWKSLEY, R. LIGHTWOOD and U. BAILEY, Arch. Dis. Childhood **9**:359 (Dec.) 1934.

Nutritional anemia or iron-deficiency anemia of infancy has as etiologic factors prematurity, twin-gestation, hypochromic anemia in the mother, prolonged feeding of milk and defective diet. The analogous iron-deficient state seen after infancy would appear to have a different background.

Four cases illustrating achlorhydria associated with this type of anemia are described. Intestinal polypi, ulcerative colitis and celiac disease are also described and discussed.

Severe and apparently causeless anemias which respond wholly or partially to iron therapy demand attention to the state of the gastro-intestinal tract. Hemorrhage from the intestine, sometimes occult, sometimes manifest and digestive, as well as absorptive failures, may each present themselves in the guise of severe anemia.

KELLY, Milwaukee.

THE INCIDENCE OF THE VARIOUS TYPES OF PNEUMOCOCCI IN INFECTIONS OTHER THAN PNEUMONIA. R. W. FAIRBROTHER, Arch. Dis. Childhood **10**:25 (Feb.) 1935.

There is a high incidence, 87 per cent, of Pneumococcus type I in cases of empyema. In other infections studied there was no such tendency of predilection of type. Early serum therapy is of decided benefit in type I pneumonia. The incidence of empyema should decrease as this form of treatment is more widely used.

KELLY, Milwaukee.

SOME OBSERVATIONS ON RHEUMATISM IN CHILDREN. T. WARWICK PRESTON, Brit. J. Child. Dis. **32**:1 (Jan.-March) 1935.

A review of cases seen at three supervisory centers for patients with rheumatism over a four year period forms the basis of this report.

One hundred and ninety-two patients gave a definite history of acute rheumatism; 134 gave a definite history of chorea; 197 had subacute and insidious rheumatism, and 259 had doubtful rheumatism.

The difficult problem of assessing "growing pains" is emphasized, and it is noted that "growing pains" are uncommon in children who are definitely known to have had acute rheumatism. Preston claims that among children with serious rheumatic carditis the general physique is remarkably good and disorders of all kinds are rare, but he also notes that in spite of this the incidence of relapse is high, even with every care.

The figures in his cases fail to show that tonsillectomy appreciably reduces the incidence of carditis or of the liability to relapse.

LANGMANN, New York.

A Case of Double Riga's Disease. P. H. Newman, Brit. J. Child. Dis. **32**:39 (Jan.-March) 1935.

A mentally deficient infant through constant rubbing of the tongue against the incisor teeth came to have first an ulcer on the lower surface of his tongue and later on the dorsum. Both ulcers healed when the respective incisors were extracted.

Langmann, New York.

Adenomata of the Pituitary, with Special Reference to Pituitary Basophilism of Cushing. William Susman, Brit. J. Surg. **22**:539 (Jan.) 1935.

Susman examined the pituitary gland in 260 patients who came to necropsy at the Manchester Royal Infirmary. In this series, 22 of the examined glands contained 23 tumors, and of these 20 were of a purely incidental character and had given rise to no symptoms. The 2 cases in which symptoms occurred were: (1) a case of acromegaly in which the anterior lobe of the pituitary contained an acidophilic adenoma and (2) a case in which an acidophilic adenoma had given rise to pressure symptoms.

In this series the basophilic tumor was the common type and occurred in association with no specific age, sex or disease.

The author concludes from the histologic data in this series of 260 hypophyses that there is no support to the contention either of Zondek, that the basophilic cells of the anterior lobe of the pituitary secrete a sex hormone, or of Cushing, that hypersecretion of basophilic cells caused by the presence in the anterior lobe of the pituitary of a basophilic adenoma gives rise to a syndrome which he has termed pituitary basophilism. Adenomas as a whole occur in 8 per cent of the cases and the basophilic type in 3 per cent, and they are therefore too common to be of any special significance.

Summerfeldt, Toronto, Canada.

Osteitis Fibrosa: An Experimental Study. Hermon Taylor, Brit. J. Surg. **22**:561 (Jan.) 1935.

In this article there is a résumé of the normal calcium metabolism and the factors that produce an abnormal calcium metabolism, with a description of the resulting changes that occur in the skeleton. This is chiefly directed to abnormalities of the parathyroid gland.

Experimental work was done on the effect of phosphatase on animals and also the effect of the administration of parathyroid extract. Taylor's summary of the results of the experiment with phosphatase follows: (1) Phosphatase is normally excreted into the urine in small amounts. (2) Phosphatase prepared from a pig's kidney is active when injected into a rabbit. (3) Phosphatase injected into a rabbit over a long period of time produces no bony lesion. (4) Phosphatase injected in large doses produces only a transient change in the plasma level. (5) Phosphatase in excess of the normal is rapidly destroyed in the body, only a very small amount being excreted.

Taylor's summary of the results of the experiment with parathyroid extract follows: (1) Prolonged injection of this extract in an adult rabbit has no effect on the bones. (2) Rabbits fed from the age of 6 weeks to 4 months a diet inadequate in calcium have a negative calcium balance and show osteoporosis of the bones, which, however, are otherwise normal in structure. (3) Young rabbits given a severe course of treatment with the extract respond at first by an increased excretion of calcium and a rise in the serum calcium level. (4) Following this initial response, in spite of continued injection of the extract, the serum calcium level and the excretion of calcium return to normal. (5) Young rabbits on a low calcium diet do not show osseous lesions other than decalcification as the result of injections of the extract, whereas (6) young rabbits on a high calcium diet show local lesions in the bones, similar histologically to osteitic fibrosa in man. (7) The lesions in the marrow caused

by an excess of the extract are (*a*) hemorrhages in the stage of active decalcification and (*b*) fibrosis with giant cell formation in the stage of healing.

At the present time Recklinghausen's disease is definitely due to hyperparathyroidism which produces hypercalcemia. The presence of hypercalcemia is itself pathognomonic of the condition. There are other associated changes, such as a low serum phosphorus level, which is an effect of ionic dissociation, and a high plasma phosphatase level, which in a decalcifying disease is indicative of the extent of the bony reaction taking place.

SUMMERFELDT, Toronto, Canada.

A CASE OF CONGENITAL HEART-BLOCK. JOSEPH LEWIS, Brit. M. J. **2**:1096 (Dec. 15) 1934.

A case of congenital heart block in a girl observed by Lewis for the first time at 8½ years is reported. It is considered congenital because so far as the author knows there was always a pulse beat of about 42. The electrocardiographic tracings are shown.

ROYSTER, University, Va.

SUBLEUKAEMIC LYMPHADENOSIS IN A CHILD. G. STEWART SMITH, Brit. M. J. **2**:1097 (Dec. 15) 1934.

An interesting and unusual case of this condition is reported, with the blood findings.

ROYSTER, University, Va.

SEVERE DYSPITUITARISM IN A CHILD. D. W. BOSWELL, Brit. M. J. **1**:252 (Feb. 9) 1935.

The case of a child with excessive obseity of the Fröhlich type is reported.

ROYSTER, University, Va.

A HISTOLOGICAL STUDY OF THE NORMAL MAMMA IN RELATION TO TUMOR GROWTH: I. EARLY DEVELOPMENT TO MATURITY. E. K. DAWSON, Edinburgh M. J. **41**:653 (Dec.) 1934.

Dawson presents the first portion of the study dealing with the changes in the breasts through the periods of life. He has not had the opportunity to examine histologically material from infants with mastitis neonatorum, but he quotes the investigations reported in literature. He believes that "milk" in the breast of the new-born infant is usually evidence of normal or excessive epithelial growth and not a true secretory product. Maternal ovarian substances act through the blood or milk of the mother on the breast tissue of the infant and stimulate growth rather than activate a true secretion.

The mammary structure develops little from birth until puberty. Pathologic growth is rare; no case of epithelial or stromal malignant growth could be found mentioned in the detail in print. Benign hypertrophy is rare until the pubescent hypertrophy begins.

NEFF, Kansas City, Mo.

CYST OF THE SPLEEN. J. W. STRUTHERS, Edinburgh M. J. **42**:19 (Feb.) 1935.

A boy of 11 years was operated on for splenic cyst, which had made itself known by a round, solid swelling in the right upper quadrant of the abdomen but which contained no characteristic edge or notch to suggest association with the spleen or the left hepatic lobe. The tumor moved slightly with respiration. The spleen and its incorporated cyst were removed, with subsequent recovery of the child.

NEFF, Kansas City, Mo.

THE MEAN DIAMETER OF THE ERYTHROCYTES IN ACHOLURIC FAMILY JAUNDICE AND THE EFFECTS OF SPLENECTOMY. J. C. HAWKSLEY and URSULA M. BAILEY, Lancet **2**:1329 (Dec. 15) 1934.

The changes which take place in the erythron in acholuric jaundice usually include a lowering of the number of red cells and hemoglobin (usually in about equal proportions), a high degree of reticulocytosis, a positive indirect van den Bergh reaction, an excessive excretion of urobilinogen and urobilin and also increased fragility of the erythrocytes and a diminution of the mean diameter, together with increased variability.

Four patients were observed from the time of admission to the hospital up to eighteen months following splenectomy. In no case has the Price-Jones curve returned to normal. In all the cases there was a quick response following splenectomy in the form of a rise in the mean diameter, which approached normal, followed in two cases by a partial swing back.

One case was observed in which both increased fragility and a diminished mean diameter were present from birth (or, more accurately, 36 hours of age) and in which no other symptoms developed for over a month.

Fluctuations in the mean diameter may in part be dependent on the number of immature red cells present, apart from the influences of splenectomy and transfusion.

LANGMANN, New York.

RENAL DWARFISM ASSOCIATED WITH VALVULAR OBSTRUCTION OF THE POSTERIOR URETHRA. R. W. B. ELLIS, Lancet **1**:142 (Jan. 19) 1935.

At the age of 3 years a boy had diphtheria and was admitted to the hospital. At this time there was a urine of low specific gravity with occasionally a trace of albumin.

He was again admitted to the hospital at the age of 8½ years; he was about 24 pounds (10.9 Kg.) below the normal weight and showed advanced rachitic deformities of the knees, ankles and wrists, ribs and skull. There was pronounced albuminuria. Intravenous pyelography was unsuccessful. At autopsy atrophic kidneys with dilated ureters and a hypertrophied bladder were noted.

LANGMANN, New York.

HEPATIC CIRRHOSIS WITH SPLENOMEGALY IN CHILDREN. W. S. LAURIE, M. J. Australia **1**:178 (Feb. 9) 1935.

Laurie reports two cases of catarrhal jaundice which later resulted in hepatic necrosis, fibrosis, splenomegaly and death. These cases are presented as evidence that catarrhal jaundice may initiate fatal damage to the liver. Patients with prolonged catarrhal jaundice should be carefully watched and the prognosis guarded.

GONCE, Madison, Wis.

HODGKIN'S DISEASE. G. F. S. DAVIES, M. J. Australia **1**:199 (Feb. 16) 1935.

Davies reviews seventeen cases of Hodgkin's disease observed in Royal Prince Alfred Hospital during the past ten years and includes the laboratory findings, the reports of biopsy and the observations at autopsy. The ratio of incidence in males to that in females was 7.5 : 1.

GONCE, Madison, Wis.

GIGANTISM, VIRILISM, AND PSEUDOHERMAPHRODITISM. J. VERNON BRAITHWAITE, Proc. Roy. Soc. Med. **28**:148 (Dec.) 1934.

A child aged 4 years was admitted to the hospital on account of overgrowth, genital precocity and deepness of voice. At birth there was some doubt as to sex, but she was brought up as a girl. The patient weighed 58½ pounds (26.5 Kg.). There was dark pubic hair present of a masculine distribution.

The genital organs had a female configuration, but the clitoris was greatly enlarged. There was no sign of a vagina. On bimanual rectal examination, under anesthesia, with a catheter in the bladder, a small mass was palpable in the region of the cervix, above and behind the catheter. A roentgenogram of the skull showed no abnormality. The suggested diagnosis was congenital hyperplasia of the adrenal cortex.

WILLIAMSON, New Orleans.

HEPATOMEGALY. ? V. GIERKE'S DISEASE. ALICE KING, Proc. Roy. Soc. Med. **28**:150 (Dec.) 1934.

The case reported is that of a boy of 3 years. The past history, the family history and the results of roentgen examination and all the laboratory investigations are given.

WILLIAMSON, New Orleans.

? IDIOPATHIC HYPERTROPHY OF THE HEART. ALAN MONCRIEFF, Proc. Roy. Soc. Med. **28**:151 (Dec.) 1934.

A child 16 months old was admitted to the hospital on account of rapid breathing, which had been present for two weeks. She also had a cough and was losing weight. On admission the heart rate was regular, with the apex beat in the fifth interspace and almost in the midaxillary line. The blood pressure was 110 systolic and 80 diastolic. The liver was 1½ fingerbreadths down. On auscultation there were no murmurs. A roentgenogram showed that the heart was enlarged in all diameters. The electrocardiogram indicated an abnormal myocardium. The results of examination of the blood and of urinalyses, as well as notes on the progress, are given in the reports. A picture of the electrocardiogram as well as a picture of the roentgenogram accompany the report.

WILLIAMSON, New Orleans.

GRAVES' DISEASE IN A CHILD AGED 8½ YEARS. H. E. MANSELL, Proc. Roy. Soc. Med. **28**:154 (Dec.) 1934.

At the age of 6½ years the patient suffered from an attack of facial impetigo with cervical adenitis, and a few weeks later he was found to have tachycardia, enlargement of the thyroid gland, slight prominence of the eyes and loss of weight. He was first given medical treatment for a few months and then received high voltage roentgen treatment. A second course of high voltage roentgen treatment was given two months later, and it was proposed to repeat the treatment every two months. The basal metabolic rate was reduced after the second course from plus 72 to plus 58.

WILLIAMSON, New Orleans.

COELIAC DISEASE WITH UNUSUAL FEATURES. HUGH THURSFIELD, Proc. Roy. Soc. Med. **28**:154 (Dec.) 1934.

A case of celiac disease in a boy of 4 years is reported. In addition to the typical signs of celiac disease, he showed clubbing of the fingers, frequent cough, a systolic murmur which was maximal over the pulmonary area and a pulse rate of 100. The report is accompanied by a picture of the patient.

WILLIAMSON, New Orleans.

PULMONARY ABSCESS. RECOVERY. DONALD PATERSON, Proc. Roy. Soc. Med **28**:156 (Dec.) 1934.

A boy, 18 months old, had his tonsils removed one week before he was brought to the hospital. The tonsils had been removed because he had been doing well for three months previously. On admission he had clicky râles over

both lungs and looked ill. A roentgenogram showed a shadow in the upper lobe of the right lung and an appearance of cavitation, with localized pneumothorax, but the subsequent clinical course during his stay in the hospital was that of an abscess. He made a good recovery.

WILLIAMSON, New Orleans.

STILL'S DISEASE WITH ERYTHEMA MULTIFORME. DONALD PATERSON, Proc. Roy. Soc. Med. **28**:157 (Dec.) 1934.

A case of this condition in a boy of 6½ years is reported. The history, the results of physical and roentgen examination and the treatment are given. The dermatologist reported that the cutaneous lesions were those of erythema multiforme, probably evidence of a former streptococcic infection.

WILLIAMSON, New Orleans.

SUPRAVITAL STAINING IN THE DIAGNOSIS OF THE LEUKAEMIAS. REGINALD LIGHTWOOD, J. C. HAWKSLEY and URSULA M. BAILEY, Proc. Roy. Soc. Med. **28**:405 (Feb.) 1935.

In the leukemias of childhood it is commonly held that nearly all cases can be placed in the group lymphatic leukemia and that exceptions are rare. The authors had been employing supravital methods in other works, so when the occasion arose they applied it in examining the blood from patients with leukemia, with material assistance. They describe in detail the technic that they used and give full reports of four cases of lymphatic leukemia, two cases of chloroma with myelogenous leukemia and one case of monocytic leukemia. Plates showing blood cells from these patients studied by the supravital method accompany the paper. In the summary the authors state that this method has been of most value in distinguishing lymphocytes from monocytes, so that most help is to be expected in the diagnosis of monocytic leukemia.

WILLIAMSON, New Orleans.

STILL'S DISEASE CURED BY GOLD. W. S. C. COPEMAN, Proc. Roy. Soc. Med. **28**:409 (Feb.) 1935.

A boy of 12 years had suffered from rheumatoid arthritis since infancy. He was admitted to the hospital suffering from swelling, limitation of movement and pain in the wrist and fingers, stiffness in both shoulders and limited rotation. The feet and ankles were very stiff and swollen; the spleen was palpable. The Wassermann reaction was negative; the tuberculin reaction was faintly positive, the sedimentation reaction in the first hour was 26 and in second hour 52. The patient was given four injections of 0.05 Gm. of aurothioproponal sodium sulfate at weekly intervals. The sedimentation reaction after the injections was 12 in the first hour and 34 in the second hour, and the child was comfortable and had no pain. He was sent away for several weeks, and on his return the report was good. He had free movement of the joints. The roentgen report on all the joints affected accompanies the article.

WILLIAMSON, New Orleans.

ACHALASIA OF THE OESOPHAGUS. K. H. TALLERMAN, Proc. Roy. Soc. Med. **28**:411 (Feb.) 1935.

A girl of 8½ years had suffered from persistent vomiting since the age of 6 weeks. Vomiting occurred only while food was being taken, never between meals, and it caused only transient distress. There was often temporary improvement after new treatment or after a change of circumstances. Vomiting was always less if the patient was kept in bed. On roentgen examination, barium sulfate cream passed without obstruction to the lower end of the esophagus where it was held up by a spasm just above the diaphragm. The whole esophagus became filled before barium sulfate passed into the stomach. The esophagus

appeared to be somewhat dilated. The child was admitted to the hospital and during her stay on the ward was gradually taught to swallow a rubber catheter and, later, an 18 gage mercury-filled tube, which she swallwed three times a day.

WILLIAMSON, New Orleans.

FACIAL TUMOR: CASE FOR DIAGNOSIS. DONALD PATERSON, Proc. Roy. Soc. Med. **28**:412 (Feb.) 1935.

A girl of 11 years struck her head against that of another girl. There was pain at the time. Six months later the mother noticed a swelling on the left side of the face, and the child had become listless and unsociable. On examination a hard mass was seen and felt over the zygomatic process of the malar bone on the left side. The mass was smooth, firm, fixed and painless. No glandular enlargement was present. The ocular disk showed papilledema, which was more marked on the left. Examination of the blood showed anemia. On incision of the tumor a small cyst filled with a thick red fluid was found. The pathologist reported that no organisms were seen in direct smear. There was no growth on blood or sugar agar in twenty-four hours. The tissue was granulation tissue rich in plasma cells and suggestive of subacute infection following trauma. There was no evidence of a neoplasm or of tuberculosis.

WILLIAMSON, New Orleans.

SPECIMEN FROM CASE OF SPONTANEOUS PNEUMOTHORAX, PYOPERICARDIUM, AND LIVER ABSCESS SECONDARY TO ABSCESS OF LUNG. W. J. PEARSON, Proc. Roy. Soc. Med. **28**:414 (Feb.) 1935.

The clinical history, the results of physical examination, the blood count, the results of roentgen examination of the chest and a summary of postmortem observations in this case are reported. The disease occurred in a child of 3 years.

WILLIAMSON, New Orleans.

SUBCUTANEOUS EMPHYSEMA COMPLICATING PNEUMONIA. C. ALLAN BIRCH, Proc. Roy. Soc. Med. **28**:661 (April) 1935.

A case of this condition in a boy of 8 years is reported. When he was first seen his physician thought that an attack of pneumonia was developing. Later the same day subcutaneous emphysema of the wall of the chest, and of the neck and the face appeared. Roentgen examination of the chest suggested partial collapse of the lower lobe of the right lung and showed air in subcutaneous tissue and between the heart and the diaphragm. There was no cough at this time. The child was extremely ill. Artificial pneumothorax was induced. After this the patient gradually improved. A cough developed, with a little frothy sputum, but no vomiting. He made a complete recovery. The report is accompanied by photographs of the patient and a roentgenogram. The results of examination of the blood and sputum are also given.

WILLIAMSON, New Orleans.

COELIAC DISEASE SHOWING UNUSUAL FEATURES. K. D. KEELE, Proc. Roy. Soc. Med. **28**:663 (April) 1935.

Besides features of celiac disease, a boy of 7½ years showed signs of rickets and on roentgen examination showed, besides the rachitic changes, multiple and symmetrical fractures of the arms and legs.

WILLIAMSON, New Orleans.

AMYOTONIA CONGENITA. A. MONCRIEFF, Proc. Roy. Soc. Med. **28**:665 (April) 1935.

A case of this condition in a boy of 4½ years is reported. There was one other boy in the family, who was normal. No similar trouble was known in the family. On admission to the hospital the child was found to have complete generalized atonia—not amounting to actual paresis—of all the muscles of the body, with the exception of those supplied by the cranial nerves. The abdominal and intercostal muscles were less affected. There was no sensory loss or spasticity, but the muscles showed marked wasting. Deep reflexes were absent. Some contractures at the knee and right ankle drop were present. Other joints were flail joints. Electrical reactions of most muscles of the limbs showed diminution or absence of response to faradism.

WILLIAMSON, New Orleans.

MEDIASTINAL CYST: SPECIMEN. E. A. COCKAYNE, Proc. Roy. Soc. Med. **28**:666 (April) 1935.

An infant of 5 months was admitted to the hospital because she had suddenly become dyspneic and cyanosed. There was marked retraction of the ribs, with considerable stridor. Breath sounds over all the left lung were diminished. The symptoms remained unchanged, and death occurred three days later. The report of the roentgen examination was: "A tumor in the upper mediastinum displacing the left bronchus." At autopsy a loculated cyst was found situated between the trachea and the esophagus and immediately above the left bronchus. A section of the tumor showed loose areolar tissue containing nerve and muscle fibers lined with columnar cell epithelium. A picture of the specimen accompanies the report.

WILLIAMSON, New Orleans.

LYMPHOSARCOMA INVOLVING HEART. SPECIMEN FROM A GIRL AGED 8 YEARS. R. S. FREW, Proc. Roy. Soc. Med. **28**:667 (April) 1935.

Until December 1933, the child was well. About that time she commenced to have a cough with much wheezing. At night the cough became paroxysmal and productive of frothy sputum. There was considerable dyspnea. In January 1934 the face and neck became swollen. She was admitted to the hospital on February 5, six weeks after the onset of the symptoms, when the right side of the chest was found to be stony-dull. In these aspirations 1,150 cc. of fluid was withdrawn. The report of the roentgen examination was: enlargement of the mediastinum by (?) a glandular mass. The cardiac shadow was much enlarged, with displacement to the left. There were small effusion and pneumothorax on the right. The child was treated with intensive roentgen therapy, but death occurred on April 14, four months after the onset.

The blood count and a picture of the tumor, with full notes on the postmortem examination, are given in the report. WILLIAMSON, New Orleans.

RENAL DWARFISM AND GLYCOSURIA. B. BUCKLEY SHARP, Proc. Roy. Soc. Med. **28**:669 (April) 1935.

This condition occurred in a girl of 10 years. The history, the results of urinalysis, examination of the blood and dextrose tolerance tests, roentgenograms of the long bones and the kidneys, the results of examination of the urinary tract and the blood pressure are given in the report.

WILLIAMSON, New Orleans.

Nervous Diseases

CHOREA IN CHILDREN: ETIOLOGY, CLINICAL FINDINGS AND TREATMENT. SAMUEL WETCHLER, Arch. Pediat. **51**:783 (Dec.) 1934.

This is a review of certain well known facts concerning chorea, with a discussion of the etiology, pathologic features, symptomatology, diagnosis and treatment. Of all the newer methods of treatment which have been advanced, Wetchler believes that phenyl-ethyl-hydantoin acts most favorably in shortening the duration of the disease and in preventing cardiac complications.

WADDELL JR., University, Va.

THE RESULTS OF PHYSICAL AND MENTAL TRAINING ON MENTALLY DEFICIENT, BIRTH LESION CHILDREN. E. W. MARTZ and H. N. IRVINE, J. Juvenile Research **18**:42 (Jan.) 1934.

Martz and Irvine report the results of an experiment in training eighteen patients with birth palsies at Letchworth Village (Thiells, N. Y.); they ranged in age from 8 to 50 years and in intelligence quotient based on the Stanford-Binet test from 20 to 62. Physical training consisted of muscle reeducation along the lines suggested by Phelps, of the Vineland Training School, together with certain especially devised manual tasks; mental training consisted of work in spelling, reading and arithmetic as well as other occupational instruction. Physical training had to be discontinued after a few months in the case of more than half the patients, either because of lack of cooperation or because age and great spasticity seemed to make the work unprofitable. It was continued for the full year during which the experiment was carried out in only two cases.

The six persons showing marked physical improvement were in the middle age range, the late teens or the early twenties and included three persons with paraplegia, two with hemiplegia and one with diplegia. Mental improvement, as indicated by a rise in the intelligence quotient, occurred in all but one person, and the functional and social levels of the patients were clearly raised. There seemed to be no direct relation between mental and physical improvement.

MCBRIDE, Philadelphia. [ARCH. NEUROL. & PSYCHIAT.]

HIGH AND PERSISTENT CARRIER RATES OF NEISSERIA MENINGITIDIS, UNACCOMPANIED BY CASES OF MENINGITIS. SHELDON F. DUDLEY and J. P. BRENNAN, J. Hyg. **34**:525 (Dec.) 1934.

The carrier rate for agglutinable Neisseria meningitidis among 10,000 sailors, soldiers and airmen, on repeated examinations for over a year, during which time there were no cases of cerebrospinal meningitis, was more than 50 per cent. At the same time in the surrounding intermingling population of 140,000 there were only 5 cases of meningitis.

During the same period, in a nearby naval group the carrier rate among contacts of 6 cases of meningitis was 5 per cent. A year previously, among the first-mentioned group, there were 11 cases, with a carrier rate among the contacts of 13 per cent.

There was no association of the carrier rate with the density of the population or the season of the year. Those of the most senior rating with the most spacious quarters had as high a carrier rate as recruits with the worst sleeping quarters.

These observations are at variance with teachings in preventive medicine. It is believed possible that a high carrier rate of organisms of low pathogenicity may prevent meningitis by raising the resistance of the herd to meningococci in general and that when the carrier rate falls or is low meningitis is likely to become more prevalent. Attempts to isolate carriers when the rate is high are impracticable.

The use of nasal and throat spraying and of other treatment may be injurious rather than beneficial and is advised against.

JANNEY, Wauwatosa, Wis.

OTITIC HYDROCEPHALUS. HUGH G. GARLAND, Lancet **2**:751 (Sept. 30) 1933.

The intracranial complications of otitis media comprise many clinical and pathologic conditions; among them is a well defined syndrome for which the name otitic hydrocephalus was first suggested by Symonds in 1931. This syndrome can usually be diagnosed on the basis of clinical manifestations, and it responds rather dramatically at times to simple therapeutic measures. The clinical manifestations of otitic hydrocephalus are: Its occurrence is almost entirely confined to children and young adults, complicating either acute or chronic otitis media; headache is frequent and may be either severe or slight; papilledema is constant, although vomiting and nausea are variable; the mental reaction is usually undisturbed, but dulness has been present in a few instances in which there has been a high grade of papilledema; the cerebrospinal fluid is under high pressure and of large volume but is normal chemically and bacteriologically. The condition usually clears up after weeks or months as a result of repeated lumbar puncture. If this procedure is not frequently carried out optic atrophy may ensue.

BECK, Buffalo. [ARCH. NEUROL. & PSYCHIAT.]

HYDROCEPHALUS WITH PRECOCIOUS PUBERTY FOLLOWING POST-BASIC MENINGITIS. BERNARD SCHLESINGER, Proc. Roy. Soc. Med. **28**:149 (Dec.) 1934.

A girl of 8½ years was one of twins. At the age of 4 months both twins suffered from postbasilar meningitis. The sister died, and a progressive hydrocephalus developed in the patient. At the age of 4 years, when first seen, she was suffering from fits, hydrocephalus, spastic paresis, spasm of the adductors and weakness of the right side of the face. At the age of 6 years she stood up. At the age of 7 years the breasts began to develop; the optic disks were becoming pale, and there were signs of optic atrophy. The patient's mentality had always been somewhat peculiar. She was mentally retarded, and at any time for no known reason would burst suddenly into abusive language.

WILLIAMSON, New Orleans.

HYDROCEPHALUS IN UTERO DIAGNOSED BY THE ROENTGENOGRAM. LAFFONT and BONAFOS, Bull. Soc. d'obst. et de gynéc. **23**:640 (Nov.) 1934.

The mother of the infant was referred to the hospital by a midwife because of difficult labor. On admission a dead fetus was found between the thighs of the mother apparently held in the uterus by its head. The uterus was distended and firm. A roentgenogram disclosed a large fetal head. This was drained of cerebrospinal fluid, and a fetus weighing 2,700 Gm. was easily extracted. The authors point out that the roentgenogram saved the mother unnecessary trauma and danger, because if the condition had not been diagnosed by this procedure an intra-uterine manipulation might have been attempted.

GLASER, Rochester, N. Y.

PRIMARY ASEPTIC SEROUS MENINGITIS. A. TCHERKASOFF and F. MERSON, Rev. franç. de pédiat. **10**:588, 1934.

Three cases of diffuse serous meningitis are reported in which the spinal fluid showed increased pressure, an increase in cells and some increase in albumin. The symptoms were similar to those of tuberculous meningitis, except that the onset was more abrupt. One case of a condition stated to be circumscribed serous meningitis localized at the base of the brain is described. This was characterized by headache, vomiting, a slow pulse rate and unequal pupils with papilledema. The spinal fluid showed no change from the normal. Recovery in all cases followed repeated spinal punctures.

LESLIE, Evanston, Ill.

A Maneuver to Elicit the Patellar Reflex in Certain Cases. V. Saggese, Riv. di clin. pediat. **32**:1159 (Oct.) 1934.

Saggese describes a maneuver to make more evident the patellar reflex. This maneuver consists of compression of the larynx or the upper part of the trachea at the time that the patellar tendon is tapped. In many cases the reflex is obtained when without this maneuver no response appeared. This procedure may be of value in differentiating cases in which the reflex tract is completely interrupted from cases in which the reflex current is merely diminished.

Higgins, Boston.

Analytic Features of the Spinal Fluid in Nonsyphilitic Diseases of the Neuraxon. Antonio Sellak Azzi, Arch. de med. inf. **3**:828 (Dec.) 1934.

This is an interesting study and should be read in detail by those interested. It consists of the findings of three hundred examinations in the study of the analytic features of the spinal fluid in nonsyphilitic diseases of the neuraxon. The studies comprise those of pressure, aspect, stains, the number of cells, the total albumin, the fraction of globulin and the Meinicke and Lange reactions.

Sanford, Chicago.

Korsakoff Psychosis in Infancy. Aqules Gareiso, Jacinto E. Viviani and Alfonso Cerdeiro, Rev. méd. latino-am. **20**:411 (Jan.) 1935.

A boy, aged 7 years, showed the classic symptoms of the psychosis described by the Russian author Korsakoff. The patient presented two distinct groups of symptoms: neurologic, characterized by polyneuritis, pseudotabetic in form, and a variety of perturbations, such as visual hallucinations of a terrifying type and typical amnesia of fixation.

The cause of this syndrome was alcoholism. The boy drank one bottle of beer every day, sometimes more, as well as apéritifs and fruits preserved in alcohol, which he stole from his grandmother. His companion of approximately the same age presented a syndrome typical of oneiric delirium. Treatment, which consisted in correction of diet, detoxication, electrotherapy and massage, restored the patient to health.

Dwyer, Kansas City. Mo.

Treatment of Epidemic Cerebrospinal Meningitis. S. M. and D. M. Zalcan-Charkov, Vrach. delo **17**:761, 1934.

The authors present a complete critical review of the methods of treatment of epidemic meningitis. The results of their observations on the methods of treatment used during the epidemic of 1931 in Charkov are given.

The material consisted of three hundred and eighteen children, and treatment consisted in: lumbar punctures, antimeningcoccic serum therapy, hydrotherapy, ventricular punctures, giving of methenamine and blood transfusions. The conclusions were as follows:

1. Infants treated with antimeningococcic serum, regardless of the time of the beginning of treatment or the amount of the serum used, showed a rather high mortality rate, even slightly higher than that of patients treated with lumbar punctures alone (42 and 39.6 per cent, respectively).

2. The older the child and the earlier the beginning of treatment the lower is the mortality, regardless of the method used.

3. The treatment with antimeningococcic serum did not present any therapeutic advantage over the systematic use of lumbar punctures alone in this series of cases. The percentage of patients who recovered and the death rate were approximately equal with both methods of treatment.

4. In view of the relatively frequent untoward reactions which follow the administration of serum the authors believe that lumbar punctures should be the therapeutic method of choice, at least in infants.

Boder, Los Angeles.

Diseases of the Eye

INFANTILE GLAUCOMA. J. F. HARDESTY, Am. J. Ophth. **17**:689 (Aug.) 1934.

Hardesty reports the case of a 2 month old baby in which a diagnosis of interstitial keratitis was first made but later changed to one of glaucoma, the tension of both eyes being 50. The baby's eyes improved under miotics and roentgen treatment of the thymus. In a second case of infantile glaucoma with tension persistently from 45 to 55 and with marked vagotonic manifestations, suggesting hyperactivity of the thymus, there was general as well as ocular improvement under ephedrine, ⅛ grain (0.008 Gm.), three times daily. He concludes that it is wise in cases of infantile glaucoma to consider the possibility of thymic hyperactivity.

REESE, Philadelphia. [ARCH. OPHTH.]

MICROPHAKIA AND SPHEROPHAKIA WITH GLAUCOMA. T. M. SHAPIRA, Am. J. Ophth. **17**:726 (Aug.) 1934.

Shapira reports the case of a 10 year old boy who apparently became short-sighted after the sixth year. In 1929 a diagnosis of myopia gravis was made, and the following year bilateral glaucoma was diagnosed. In 1930 it was noted that pilocarpine hydrochloride brought on a glaucomatous attack, and in 1932, that homatropine hydrobromide lowered the intra-ocular tension. Examination of both eyes revealed iridodonesis and shallow anterior chambers. The zonule and entire border of the lens were visible through a pupillary area of 8 mm. Biomicroscopy showed marked curving of the anterior and posterior surfaces of the lens and an obtuse-angled equator. Without drops the tension was 36 mm. (Schiötz) but rose to 51 on administration of pilocarpine hydrochloride. After the use of homatropine hydrobromide the tension fell to 25, and following treatment with atropine, to 15. Both lenses were removed, and fairly good vision was obtained with the usual aphakic correction, the myopia quite evidently being lenticular. A second case occurring in an imbecile is reported, and the literature is reviewed.

REESE, Philadelphia. [ARCH. OPHTH.]

RÔLE OF THE GONOCOCCUS IN PURULENT OPHTHALMIA IN WARM CLIMATES. A. F. MACCALLAN, Arch. Ophth. **12**:819 (Dec.) 1934.

The pannus of trachoma is a defense against ulceration of the cornea caused by gonococcic conjunctivitis, but trachoma predisposes the conjunctiva to infection by the gonococcus. In Palestine and Egypt the gonococcus is not venereal in origin, but is transferred from eye to eye by fingers, garments and towels. Ophthalmia neonatorum is rare in the Orient as compared with Europe. The gram-negative diplococci obtained from the discharge of patients with conjunctivitis differed in no way from those in cases of urethritis.

WESCOTT, Chicago.

TESTING THE EYES OF SCHOOL CHILDREN: A NEW TEST CABINET. W. L. GOULD, Arch. Ophth. **13**:60 (Jan.) 1935.

The difficulties of testing the eyes of children in large groups in schools are numerous. Large numbers must be tested early in the school year so that those needing attention may receive proper care as soon as possible. Adequate facilities are not at hand in the schools for proper testing, such as constant illumination, proper rooms in which to make the tests and trained examiners. Records and methods are not standardized in the same school system and may vary in the rooms of the same school.

To overcome many of the difficulties, a test cabinet has been devised which affords good illumination, is portable, prevents memorizing, lessens the time for the tests and standardizes procedure in testing and follow-up study.

WESCOTT, Chicago.

NYSTAGMUS IN INFANTS: REPORT OF A CASE OF MONOCULAR HORIZONTAL TYPE. P. J. MOORAD, Arch. Ophth. **13**:238 (Feb.) 1935.

Moorad reports a case of unilateral horizontal nystagmus in an infant without relationship to the coexisting pathologic state. At 2 months of age a previously well infant living under dire conditions was noted to have nodding of the head, which ceased, and nystagmus of the right eye which continued for five more months. At 6 months the child was brought to the hospital with an infection of the upper respiratory tract, from which it recovered completely, but during which time the nystagmus was present. A month later homatropine was instilled for a check-up, and the parents noted that the nystagmus ceased after the instillation of the mydriatic and did not recur.

WESCOTT, Chicago.

A YEAST-LIKE FUNGUS INFECTION OF THE CONJUNCTIVA. AVERY A. DRAKE, J. Missouri M. A. **32**:6 (Jan.) 1935.

A well nourished girl of 12 years was seen three days after the beginning of an ocular infection. There were mild inflammation of the tarsal conjunctiva and considerable chemosis around the lower half of the cornea but no abnormal secretion.

Three days later a small grayish-white area developed near the inner canthus, and chemosis completely surrounded the cornea. This looked like a collection of pus and was incised twice, without result. No form of therapy used influenced the condition. Twelve days later the right preauricular gland became tender and swollen, and five days later many cervical glands on the same side became involved.

The patient, who up to now had been feeling well, began to feel badly and was removed to the hospital. More areas developed from one canthus to the other in the lower lid. Her temperature rose to 103.2 F. Tests for tularemia gave negative results.

Dr. C. E. Rice of the United States Public Health Service made studies of excised conjunctival tissue by culture and in preparations of potassium hydroxide, as well as of aspirated material from the softened preauricular gland. Highly refractile globular bodies from 2 to 5 microns in diameter were seen, many showing a distinct budding.

Culturing was very disappointing. No mycelium was observed.

A probable diagnosis of blastomycosis was made.

A 1 per cent solution of potassium iodide was used in the eye. Saturated solution of the same was given by mouth (12 drops daily), and 15½ grains (about 1 Gm.) of sodium iodide was given daily intravenously.

The condition yielded readily to this form of treatment. The eye was apparently normal in every respect; four or five moderately enlarged cervical glands remained, but these were without tenderness.

BERGER, Kansas City, Mo.

THE PROBLEM OF THE CROSS-EYED CHILD. LUTHER C. PETER, West Virginia M. J. **30**:529 (Dec.) 1934.

In the great majority of cases squint is amenable to treatment. The embarrassment of the child alone calls for relief; physical and mental development demand relief, and the lifelong handicap to the person in the matter of useful activities and opportunities make it incumbent on the physican to be alert to the needs of the cross-eyed child.

The causes of squint and the evolution of the symptoms are reviewed. Early treatment of the condition is urged: "Begin the correction of squint as soon as it becomes established and aim to complete the treatment before the child is of school age." Glasses may be prescribed as early as at 15 months. When operative treatment is necessary it should be carried out before school age. That gives the best opportunity for perfect results.

SHAWKEY, Charleston, W. Va.

CONGENITAL COLOBOMA OF THE MACULA, TOGETHER WITH AN ACCOUNT OF THE FAMILIAL OCCURRENCE OF BILATERAL MACULAR COLOBOMA ASSOCIATED WITH APICAL DYSTROPHY OF HANDS AND FEET. ARNOLD SORSBY, Brit. J. Ophth. **19**:65 (Feb.) 1935.

Sorsby gives a detailed history and description of lesions present in a mother of five children of a family consisting of the parents and seven children. It is impossible in an abstract to review the findings in each of the affected persons, but the author's excellent summary supplies the essentials:

The literature on congenital macular coloboma is reviewed, and from the sifted material twenty cases of bilateral, thirty-six of unilateral and three (possibly five) of familial macular coloboma are considered. There is nothing in the ophthalmoscopic appearances of the lesion to stamp any particular defect as definitely congenital as opposed to those of postnatal origin.

Attention is drawn to cases in which macular coloboma was present with a typical choroidal coloboma in the same eye, also to cases in which macular coloboma was associated with other atypical colobomatous defects.

One suggestion which emerges is that nonpigmented colobomas tend to be deeply excavated, while in pigmented colobomas excavation is relatively less marked.

It appears that in addition to the recognized varieties of nonpigmented and pigmented macular coloboma, a third type, aptly described as a wheel figure, has a fairly characteristic appearance. In this type the center is white, and from it pigmented spokes radiate toward a pigmented rim.

Studies in the pathologic anatomy of macular coloboma, though none of them is conclusive, appear to indicate that there is no basis for the belief that congenital macular colobomas are the result of intra-uterine inflammation.

A description is given of a familial group consisting of a mother and five children who showed bilateral pigmented macular coloboma. Associated with this defect was a rare skeletal abnormality known as apical dystrophy of the hands and feet. In one of the patients the condition of solitary kidney was present.

Attention is drawn to the studies of Landauer on the creeper fowl, a breed characterized by skeletal defects and ocular abnormalities. Consideration is also given to the work of Bagg and Little and their collaborators in experimental production of hereditary defects in mice, the defects involving the eyes, feet and kidneys.

Arguments are advanced in favor of regarding macular coloboma as a localized choroideremia.

There are two colored drawings and eight black and white reproductions of the fundus and ten plates showing the skeletal defects as revealed by the roentgen rays.

An extensive bibliography is appended.

ZENTMAYER, Philadelphia. [ARCH. OPHTH.]

A CASE OF INFLAMMATORY PSEUDO-TUMOR OF THE ORBIT. T. COLLEY, Brit. J. Ophth. **19**:93 (Feb.) 1935.

A boy, 13 years of age, had had the right eye and orbital contents removed the previous year by another surgeon because of a growth which the biopsy had shown to be of a chronic inflammatory nature. The pathologic examination showed a whitish mass almost cartilaginous in consistency surrounding the optic nerve. It was made up of inflammatory tissue only, suggestive of a syphilitic origin. Both Wassermann and sigma reactions were negative.

An increasing proptosis with downward and outward displacement of the left eyeball occurred. Below the inner part of the brow a nodular swelling could be seen. It gave the impression of a growth which was infiltrating the orbital tissues. The central retinal vein was obstructed. The Wassermann reaction was again negative. Exploratory incision was refused, as the parents believed that a similar operation on the other eye aggravated the condition. Antisyphilitic treatment was given, and twenty months later the eye and orbit were normal.

The article contains a bibliography.

ZENTMAYER, Philadelphia. [ARCH. OPHTH.]

THE REFRACTIVE ERROR OF TWINS. F. W. LAW, Brit. J. Ophth. **19**:99 (Feb.) 1935.

Law gives the refraction anomaly in eight pairs of presumably monozygotic twins. In order to be on the safe side he uses the less committal term "identical." The refraction anomaly in three pairs of dissimilar twins is given. Of the eight pairs, no less than four pairs were squinters, and one member of another pair had a slight error of convergence. He concludes from the admittedly small number of observations that: 1. Identical twins have by no means always identical refractions. 2. The refractions are alike in identical twins at least twice as often as they are in brothers and sisters born at different times. 3. Strabismus occurs oftener in twins than in siblings of different ages; it occurs sometimes in one member of the pair only, but far more commonly in both members, and then is of the same nature and direction in each.

ZENTMAYER, Philadelphia. [ARCH. OPHTH.]

XEROPHTHALMIA AND ITS TREATMENT: A NEW INDICATION FOR A CENTRAL TARSORRHAPHY. H. DE VILLIERS, South African M. J. **9**:13 (Jan. 12) 1935.

De Villiers recommends central tarsorrhaphy in cases of xerophthalmia with involvement of the cornea in which the prognosis seems bad under dietetic treatment alone. The operation (1) reduces the exposure of the eye, (2) increases the temperature of the cornea, (3) increases the humidity of the corneal surface and eliminates the desiccating influence of the air, (4) reduces the exposure of the eye to the bright light and (5) permits use of the eye by looking sharply to either side.

GONCE, Madison, Wis.

ORBITAL NEOPLASM OF DIFFICULT DIAGNOSIS. V. MORAX and F. ROUSSEAU, Ann. d'ocul. **172**:41 (Jan.) 1935.

A young girl of 11 years, following a slight infectious condition considered to be influenza, started to show an inflammatory process in the left orbital region, with swelling of the upper lid, lowering of the left globe and a palpable new growth. Progressively and slowly the tumor invaded the whole orbit, and exophthalmos became so severe that the globe was completely immobile. About this time there appeared on the cornea erosions which caused great irritation and photophobia.

About one year later, as none of the treatments employed had arrested the progress of the lesion, the contents of the orbit were removed. The new growth was adherent on one side to the bony orbit and on the other to the muscles and posterior part of the globe. By diffuse infiltration it had penetrated the muscles, superficial layers of the sclera and adipose and other tissues. On account of its extreme rarity sections were submitted to Redslob of Strasbourg, who replied that he had never seen anything like it and did not possess any similar specimen in his collection. Regaud examined the sections and could not pronounce on them. Because of the particularly large number of eosinophil cells, Morax thought that the neoplasm was perhaps due to the action of a mycelium. The mycelium network, however, did not correspond to that in sporotrichosis, actinomycosis or streptotrichosis.

MCKEE, [ARCH. OPHTH.]

BENIGN CONGENITAL MELANOSIS OF THE EYE. J. FRANÇOIS, Arch. d'opht. **51**:689 (Nov.); 775 (Dec.) 1934.

Desmarre first described this rare condition in 1847. To date one hundred cases have been recorded in the literature. François presents brief abstracts of the reports in chronological order. He then describes and illustrates with striking colored plates three new cases; in two the condition was unilateral, and in one bilateral. The principal symptoms of this condition are pigmentation of the sclera and increased pigmentation of the iris and fundus. The various types of scleral

pigmentation are described from the standpoint of the cases which have been reported. The increases in the pigment of the iris and fundus are dealt with in a similar way. Secondary symptoms include pigmentation of the cornea, papilla, conjunctiva, lids, skin and hair. In only a few instances have other congenital anomalies been observed. These, he believes, have been merely coincident. The patients are free from functional disturbances, since there are no changes in the visual acuity, field of vision, light sense or color sense. In the differential diagnosis this condition must be distinguished from pathologic coloration of the sclera and pathologic pigmentation. These disorders are briefly described. The pathologic changes are systematically reviewed and the hereditary and congenital nature of the condition considered. The literature offers little evidence as to whether the pigmentation progresses or remains stationary. It appears rarely to have increased. The question of malignant degeneration is most important. Since sarcoma most commonly arises from the heavily pigmented structures of the eye, such pigmentation must be admitted to have some influence on the development of a tumor. On the other hand this tendency must not be exaggerated, as the number of cases of sarcoma developing in a melanotic eye is very limited. A further consideration is that those who have reported on large numbers of melanosarcomas have only exceptionally found this tumor accompanied by abnormal ocular pigmentation. A complete bibliography of this subject is appended.

MARLOW, Syracuse, N. Y. [ARCH. OPHTH.]

PRIMARY SARCOMA OF THE INFERIOR OBLIQUE MUSCLE. D. MICHAIL, Arch. d'opht. **51**:755 (Dec.) 1934.

A primary tumor of a muscle is rare; one of a muscle of the eye is very exceptional. Michail reports a case in which a tumor was found in the inferior oblique muscle of the left eye in a child 10 years old. It was excised and found to be a large round cell sarcoma which had completely replaced the muscle in the affected part and was spreading through the muscle. Such a tumor is of very rare occurrence in the orbit. Michail reviews the reports in the literature; only six undoubted cases have been recorded so far, including his own. In three of these six cases the superior rectus muscle was involved; in two, the internal rectus muscle, and in one, the inferior oblique muscle. Two occurred in children 2 and 10 years of age; four in adults. In four cases the course was rapid (from one to three months); in two chronic (from one to three years). In no case has there been recurrence. In three cases the involved muscle was extirpated; in two cases the orbit was wholly exenterated, and in one there was a subtotal exenteration. The reports in the literature are listed.

MARLOW, Syracuse, N. Y. [ARCH OPHTH.]

ACUTE PSEUDOMEMBRANOUS CONJUNCTIVITIS WITH BUCCOPHARYNGEAL ERUPTION AND WITHOUT DIPHTHERIA. M. BENOIT, Bull. Soc. d'opht. de Paris, December 1934, p. 616.

For about one month the patient had a bullous eruption on the surface of the pharynx. The general condition was poor, with articular pains and fever. The eyelids were edematous. In the culdesacs and on the palpebral conjunctivae was a grayish membrane, easily detached and leaving no bleeding. The diphtheria bacillus was not found in smears from the pharynx or conjunctiva. All other tests, including those for tuberculosis and syphilis, gave negative results. The patient gradually began to lose the symptoms and signs of disease and after about six weeks was entirely well. The cause of the condition still remains a mystery, as all cultures were negative.

MAYER, Chicago. [ARCH. OPHTH.]

A Case of Angiomatosis of the Retina. R. Isnel, Bull. Soc. d'opht. de Paris, December 1934, p. 652.

A girl 8 years old began to lose vision in the right eye and at the same time had left hemiplegia. At intervals she experienced violent headache, nausea and frequently vomiting. Now, at the age of 14, only perception of light remains. Externally the eye is normal. The disk is hyperemic; the retinal vessels are markedly dilated and tortuous. A roentgenogram of the skull shows dilatation and tortuosity of the vessels in the right anterior convexity. Other examinations revealed normal findings. The mother has normal fundi but has an angioma of the skin of the forehead in the midline. Three sisters and one brother show no evidence of retinal, cranial or cutaneous angiomas. The father is in a sanatorium with pulmonary tuberculosis.

Mayer, Chicago. [Arch. Ophth.]

High Myopia at the Age of Two Years: Macular Necrosis with Perforation of the Retina of One Eye and Macular Atrophy of the Other. M. E. Kalt, Bull. Soc. d'opht. de Paris, January 1935, p. 14.

An infant with signs of mental deficiency had one brother whose vision was normal and a sister with 16 diopters of myopia. Skiascopy of the patient revealed 18 diopters of myopia for the right eye and 12 for the left. The visual acuity was estimated as 1/30 and 1/10 in the right and left eyes, respectively. Ophthalmoscopically, the right eye revealed an enlarged disk with a staphyloma limited entirely to the temporal side. The macular area was of a deep carmine color. Kalt believes that some of the changes are due to thrombosis of the central artery.

Mayer, Chicago. [Arch. Ophth.]

Hematic Disciform Infiltration of the Cornea. F. Schousboë and G. Morard, Bull. Soc. d'opht. de Paris, January 1935, p. 17.

Schousboë and Morard report two cases. In the first an infant of 5 years was struck in the left eye with a rifle butt. There was an immediate hemorrhage completely filling the anterior chamber. After some weeks the hemorrhage had partially absorbed, leaving a whitish disk which looked like a luxation of the lens into the anterior chamber, but as glaucoma ensued the child was hospitalized, and enucleation followed. On histologic examination the disk was found to be red blood corpuscles in the stroma of the cornea.

The second patient was in an automobile accident. The entire anterior chamber of one eye was filled with blood. Gradually a whitish disk was seen to form in the globe. With the experience of the first case to be considered, a diagnosis of disklike hemorrhage into the cornea was made. There was a gradual clearing, and on last examination a small leukoma like a tiny lens was all that remained of the disk. A review of the literature reveals that every case reported was due to an injury. Hypertonia is a usual complication. The authors suggest that instead of referring to the condition as apoplexy, hemorrhage, infiltration or impregnation or pigmentation of the cornea, the term "hematic disciform infiltration of the cornea" be used. Pictures and a bibliography are included.

Mayer, Chicago. [Arch. Ophth.]

Strabismus of Unusual Origin with Medical Cure. M. A. Terson, Bull. Soc. d'opht. de Paris, January 1935, p. 22.

The patient was a 9 year old girl. Her father had died of pneumonia three days previous to her trouble. On examination she revealed redness and pain in the right eye. Two days later an internal deviation of 40 degrees was noted. The condition was apparently a paralysis of the sixth nerve. However, the external rectus muscle was able to turn the right eye out with no signs of a saccadic movement. With a low degree of myopic correction visual acuity was normal for both

eyes. Outside of being highly emotional the child had no physical or mental disabilities. Bromides and potassium iodide were prescribed. Two pairs of glasses were worn, the first having a half-moon opacity for the right eye to suppress the diplopia, the second with correction for the right eye and a totally opaque glass for the left. For a week there was no change in the condition. After the fourth week the deviation was only 15 degrees. In two months' time no deviation could be recorded. Other cases are cited showing that in some similar states an immediate operation has been given credit for a good cure when medication and time might have produced like results.

MAYER, Chicago. [ARCH. OPHTH.]

PAPILLORETINAL EXUDATE OF DENTAL ORIGIN. P. BONNET and J. BUSSY, Bull. Soc. d'opht. de Paris, January 1935, p. 56.

Bonnet and Bussy report on a patient, aged 18 years, who suddenly had a lowering of vision of the right eye. On examination a positive central scotoma was demonstrable, while the fundus in the macular area presented a star figure as often seen in the retinitis of nephritis. General examination failed to reveal anything of importance besides six infected devitalized teeth. In spite of the fact that the authors did not feel that the condition of the teeth could account for the retinal lesion, the teeth were removed. There was a gradual diminution in the completeness and size of the central scotoma, and the lesions of the fundus disappeared after a short time. The visual acuity increased to 1/3. Some degeneration in the macular area must have occurred. The case is presented in order to get other opinions.

MAYER, Chicago. [ARCH. OPHTH.]

PROGNOSIS AND TREATMENT OF HYDROPHTHALMIA. FELIX TERRIEN, Progrès méd., Feb. 9, 1935, p. 221.

Terrien reports two cases of hydrophthalmia. The first patient, a child of 10 years with congenital glaucoma of the right eye, had been operated on seven years previously. The volume of the eye decreased following operation, but the optic atrophy had already advanced to such a stage that it was impossible to preserve any vision. The second patient was a child of 6 years with bilateral congenital glaucoma, who had received no treatment. The child suffered intensely from light, and the volume of the eyes was greatly increased. Infantile glaucoma is characterized by marked increase in tension, enlargement of the cornea, a deepened anterior chamber, subluxation of the lens and iridodonesis. Terrien makes a plea for early recognition of the condition and for sclerectomy according to the technic of Elliot.

LESLIE, Evanston, Ill.

THE ONLY EFFICIENT PROPHYLAXIS OF THE SOCIAL SCOURGE, TRACHOMA. TALBOT, Rev. internat. du trachome **12**:15 (Jan.) 1935.

Trachoma is a contagious infection and is transmitted most often by direct contact. Generally trachoma in adults is but a reactivation of a latent primary infantile infection. Children usually acquire the disease before the school age from their nurse or from contact with infected children. Infection at school is exceptional. A regression of endemic trachoma can be secured only through the general treatment and cure of latent infantile trachoma. Any other program must prove illusory.

LEBENSOHN, Chicago. [ARCH. OPHTH.]

CONGENITAL FISTULA OF THE LACRIMAL GLAND. T. SCHORNSTEIN, Arch. f. Augenh. **109**:86, 1935.

A case of a fistula of the lacrimal gland is reported, occurring in the left upper eyelid of a 25 year old patient. A small opening at the junction of the middle

and outer thirds was found in the upper eyelid, slightly covered with hairs which simulated lashes. A sound could be passed into this and led into the region of the lacrimal gland. Tears came through this opening whenever the flow of tears was artificially induced in the eye. Mucoid pus could be expressed occasionally. There was never any pain or indication of inflammation in the parts concerned, and the fistula had been present since birth.

The fistula was filled with iodine paste and treated with the roentgen rays, and the fistulous tract was excised and examined histologically. A discussion follows as to the mode of development of such fistulas, and similar cases in the literature are referred to.

ADLER, Philadelphia. [ARCH. OPHTH.]

HEREDITY OF CONGENITAL UNCOMPLICATED BLEPHAROPHIMOSIS. I. JOHN, Arch. f. Ophth. **133**:60 (Nov.) 1934.

This congenital anomaly was first described by van der Hoeve under the name "abnormal length of the canaliculi with ankyloblepharon." The external canthi have normal shape and position, while the nasal canthi are displaced toward the temporal side. Thus the palpebral fissures are shortened horizontally. The lower punctum has maintained its normal relation with regard to the (abnormally located) inner canthus. The upper punctum is displaced toward the nasal side. The semilunar fold is normal. The caruncle lies on the inner side of the lower lid. Many patients with this type of palpebral abnormality suffer from epiphora because of the abnormal position of the puncta. They look as though they had a convergent squint.

The author reports a family in which many members showed this anomaly. The pedigree indicated that the inheritance of uncomplicated blepharophimosis follows the dominant type.

KRONFELD, Peiping, China. [ARCH OPHTH.]

PATHOGENICITY OF THE INCLUSION VIRUS FOR THE EYE OF THE NEW-BORN AND FOR THE FEMALE GENITAL TRACT. F. HAMBURGER, Arch. f. Ophth. **133**:90 (Nov.) 1934.

Hamburger has studied ninety cases of conjunctivitis catarrhalis in new-born infants seen at Linder's clinic during the year 1933. According to the severity and bacteriologic findings, these ninety cases can be grouped as in table 1.

TABLE 1.—*Grouping of Ninety Cases According to Severity and Bacteriologic Findings*

Severity	Cases Presenting Gonococci	Cases Presenting Inclusion Bodies	Cases in Which No Germs Were Found
Very severe	11	20	..
Moderately severe	1	15	5
Mild	..	6	32

The incubation period has been as in table 2.

TABLE 2.—*Periods of Incubation in Relation to Types of Germs and Severity*

Type of Germs	Severity	Duration of Incubation Period in Days													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Gonococci	I	..	..	5	3	1	1	..	1	..	..	..	..	..	..
Gonococci	II	..	..	..	..	..	..	..	..	1	..	..	..	..	..
Inclusion bodies	I	..	..	3	1	2	3	3	4	3	..	..	1	1	..
Inclusion bodies	II	..	..	..	..	..	1	5	2	4	1	..	1	..	..
Inclusion bodies	III	..	..	..	..	..	..	1	1	1	1	..	..	..	2

The incubation period of the conjunctivitis produced by the inclusion virus varies considerably. Linder believes that in the cases with an apparently shorter incubation period the infection takes place earlier because of premature rupture of the fetal membranes. Hamburger is inclined to interpret the varying incubation period as a sign of slow reproduction of the inclusion virus. The visible manifestations of the disease do not develop until a certain number of micro-organisms are present in the epithelium of the conjunctiva. The time which it takes to reach this stage depends, in the case of a slowly multiplying virus, mainly on the number of micro-organisms which have entered the eye at the time of infection. This number varies greatly and so does, accordingly, the incubation period of inclusion virus conjunctivitis.

The pathologic changes produced in the female genital tract by the inclusion virus have been recognized (Fritsch, Hofstätter and Linder: *Arch. f. Ophth.* **76**:547, 1910) but have never received much attention from gynecologists. In Hamburger's series twenty of the thirty mothers whose babies had inclusion virus blennorrhea stated that there had been a vaginal discharge during the pregnancy. In some cases this discharge had started before the pregnancy and persisted for a long time after its termination. In one case two babies of the same mother who were born two years apart showed inclusion virus blennorrhea.

The clinical manifestations of the disease produced by the inclusion virus in the female genital tract are those of a chronic vaginal catarrh and look much like a subacute gonorrhea. Acute diseases of the adnexa uteri are apparently not caused by the inclusion virus. Hamburger brings up the question whether or not the so-called salpingitis lenta adhaesiva, the etiology of which is unknown, is caused by the inclusion virus.

KRONFELD, Peiping, China. [ARCH. OPHTH.]

Diseases of Ear, Nose and Throat

IONIZATION OF THE NASAL MUCOSA: RELATIONSHIP BETWEEN REAGINS IN THE BLOOD AND EFFECT OF TREATMENT. PRELIMINARY REPORT. H. L. ALEXANDER and J. H. ALEXANDER, J. Allergy **6**:240 (March) 1935.

As the result of experimental work on fifty-three patients with nasal allergy on whom nasal ionization was done, twenty-five of whom were tested in two weeks and in three months, the authors concluded that "it would appear that in patients seeking ionization treatment for nasal allergy the chances of relief are greater if no reagins in the blood are present. Whether or not this is a probability can be confirmed only by further statistics."

HOYER, Cincinnati.

CONGENITAL GLOSSO-EPIGLOTTIC CYST IN AN INFANT. ROBERT CLÉMENT and A. LEMARIEY, Bull. Soc. de pédiat. de Paris **31**:438 (Nov.) 1933.

A girl 2½ years old had been seen at the age of 3 months at the Trousseau Hospital because of severe respiratory difficulty. A month after birth she began to have stridor, which became progressively worse. There was also slight dysphagia. On admission to the hospital she had an infection of the upper respiratory tract, was markedly dyspneic, had cyanosis and appeared on the verge of suffocation. Roentgenologic examination showed no evidence of enlargement of the thymus or lymph glands and no opaque foreign body in the larynx, trachea or bronchi. Direct laryngoscopic examination revealed the presence of a cyst the size of a hazelnut in the right glosso-epiglottic fossa, pressing against the right half of the epiglottis and the right aryepiglottic fold and riding over the laryngeal cavity with every inspiration, almost blocking it. It was tense and translucent, and the surface appeared bluish, with a network of fine vessels over it. It was decided to aspirate this cystic tumor to relieve the dyspnea, and the external route was chosen, because on a previous occasion when a similar growth was operated on

through the mouth bronchopneumonia developed and the infant died. A needle was inserted through the integument of the neck; the tumor was pushed toward it by a finger which was introduced through the mouth, and from 2 to 3 cc. of thin serous fluid was withdrawn. Immediate relief from dyspnea was obtained, and the appearance of the larynx returned to normal. Contrary to expectation, the cyst did not refill, and two years later only a small fibrous nodule could be seen where the large swelling had been previously. It is thought that the cyst was probably of congenital origin, either of the dermoid type, related to the branchial hyoid arch or belonging to tumors of the base of the tongue, originating in the thyroglossal tract.

BENJAMIN, Montreal, Canada.

DYSCHONDROGENESIA OF THE EARS. M. TORELLO CENDRA, But. Soc. catalana de pediat. **6**:193 (July-Aug.) 1933.

The author calls attention to the social disadvantages of deformed ears. He suggestes the name "dyschondrogenesia" as a general term to describe all the congenital malformations. He describes the technic of their surgical correction.

WATSON, Elmhurst, Ill.

PATHOGENESIS OF ALA NASI SYMPTOM IN STUTTERERS. EMMA MOŚCISKER, Monatschr. f. Ohrenh. **69**:106 (Jan.) 1935.

Mościsker shows that in associative aphasia there are movements of the alae nasi that correspond to the alae nasi respiration during pneumonia. She thinks that they are the result of a hyperkinesia which in turn is caused by a disturbance in the basal ganglions, and she considers it likely that the respiratory center as an intermediate link plays a part in the genesis of this symptom. She assumes that during pneumonia and during associative aphasia analogous chemical processes are at work.

EDITOR'S ABSTRACT. [ARCH. OTOLARYNG.]

INTERNAL STUTTERING. H. FREUND, Monatschr. f. Ohrenh. **69**:146 (Feb.) 1935.

Freund's studies on internal stuttering are chiefly the result of observations on himself. He points out that several other authors who investigated stuttering in themselves stress the preexperience of the sound difficulty, and in observations on himself he discovered the same. To him, this preexperiencing of the speech difficulties appears as an internal stuttering that is entirely analogous to external stuttering. The pathologic adjustment movements elicited by the extremely vivid imagination of the feared difficulty are the somatic correlation of this internal stuttering. The ego experiences itself as stuttering, when, prepossessed by the difficulty, it internally expresses the words to itself in a testing preexperience and in this process discovers the difficult word. Thus, internal speaking and the initial motor movements connected with it play an important rôle in internal as well as in external stuttering. Whereas former investigators stressed the imagining of erroneous speech movements as the important factor in stuttering, these observations stress instead the disturbed attempt at internal speaking. Freund shows that many of the psychologic peculiarities of stuttering are made possible by the phenomena of internal speaking. In the further development of the disorder an introverted deviation takes place. The internal speaking becomes the censor that is placed between thought and external expression of speech. Internal stuttering is accompanied by different somatic manifestations. Respiration may become inhibited; the head may be held stiff, and the look may become staring. Self-observation of the stutterer discloses feelings of tension and disagreeable sensations in the larynx and at the sites of articulation. In discussing the treatment, Freund suggests, in addition to psychotherapy, clear internal speaking with emphasis on the voice factor, on the extension of the syllables and on the rhythm and melody and with overemphasis on rest. This modified internal speaking could

eventually be supported by toneless movements of the organs of articulation. Moreover, an attempt may be made to overcome the internal stuttering by directing the attention to indifferent speech activities. The attention should be taken away from experiences in the patient's own body, such as the heaviness of the extremities, the stream of respiration and so on. EDITOR'S ABSTRACT. [ARCH. OTOLARYNG.]

STRUCTURE OF LOWER (NASAL) SECTION OF NASOLACRIMAL DUCT. L. A. ZARITZKY, Monatschr. f. Ohrenh. **69**:166 (Feb.) 1935.

Zaritzky shows that opinions about the structure of the lower portion of the nasolacrimal duct are still divided. Some investigators maintain that there are valves at the lower end, while others deny this. He studied the structure of the nasolacrimal duct in the corpses of ten children and twenty-two adults. He found that the fibrous layer of the nasolacrimal duct consists of numerous connective tissue fibers with many closely adhering elastic fibers that run parallel to the longitudinal axis of the canal. In addition to the longitudinal fibers, there are transverse and oblique fibers which fix the longitudinal fibers, so to speak. In some portions of the duct, particularly at its end, where some authors assume the valve to be, there are circular, usually elastic, fibers that form a sphincter and close the canal. Zaritzky was unable to detect a typical valve, but often he observed in its place a protrusion of the mucous membrane into the lumen of the canal, apparently as the result of an inward pressure of the circular fibers that are located there. In some specimens he observed near the connective tissue sphincter (two or three such sphincters were detected in the examined section of the duct) smooth muscle elements, which apparently increase the activity of these sphincters. The bundle of circular fibers is especially noticeable in persons over the age of 16 years. During early childhood, the accumulation of these fibers is much less noticeable. He thinks that this might be the reason that children are more subject to conjunctivitis of nasal origin. Moreover, this applies also to persons with chronic atrophic rhinitis in whom, as the result of atrophic changes in the mucous membrane of the nasolacrimal duct and of a weakness of the circular fibers, the lumen of the duct gapes so that micro-organisms and nasal secretion may enter into the duct. Zaritzky states further that between the periosteum and the fibrous layer of the duct, particularly in its lower portion, there is a close venous net, which apparently is closely connected with the cavernous plexus of the nasal cavity. In young children the cavernous plexus is incompletely developed. He observed that in children the opening on the lower part of the nasolacrimal canal is ellipsoid or cleftlike, while in the aged the opening is usually triangular, probably because the contracting power of the circular fibers decreases with advancing age. EDITOR'S ABSTRACT. [ARCH. OTOLARYNG.]

Diseases of the Skin

SPECIFICITY OF A STREPTOCOCCUS ISOLATED FROM PATIENTS WITH PEMPHIGUS: PRELIMINARY REPORT. ASHTON L. WELSH, Arch. Dermat. & Syph. **30**:611 (Nov.) 1934.

Welsh reports his bacteriologic studies of the blood, of material obtained from the nasopharynx and of the fluid from blisters of seven patients with pemphigus. He describes the methods and mediums used for the culturing of the Streptococcus. Streptococci were isolated which were similar in morphologic features, staining reaction, cultural characteristics, fermentation reaction and cataphoretic mobility. Detailed reports of the author's experiments with animals, the intradermal and subcutaneous injection of dead organisms into patients with pemphigus and evidence that the streptococci isolated were serologically identical are included. The fact that the mobility of the respective strains of Streptococcus is reduced by the serums from patients with pemphigus, dermatitis herpetiformis, lupus erythematosus and erythema multiforme, as compared with their mobility in a solution of sodium chloride, was used as a differential diagnostic test between these four diseases. DULIN, Iowa City.

VERRUCAE: A REVIEW. JOSEPH M. GOODMAN JR. and ARTHUR M. GREENWOOD, Arch. Dermat. & Syph. **30**:659 (Nov.) 1934.

The status of warts up to the present day is reviewed. They occur in man, cattle, dogs and horses. There is a contagiousness of, and relationship between, the following kinds of warts: verruca vulgaris, filiform warts, verruca plana juvenilis and condyloma acuminatum. The plantar wart, though contagious, seems unrelated to the aforementioned types. All warts are produced by a filtrable virus. An unsuccessful attempt to produce encephalitis in guinea-pigs by inoculation of ground-up material from warts is reported. Considerable space is given to a discussion of the various types of treatment used at present—among others roentgen and radium irradiation, intramuscular injection of various materials such as bismuth subsalicylate, sulfarsphenamine, saline solution, distilled water and sterile milk, local application of drugs and psychotherapy. The value of any one form of treatment over another is uncertain as control series have not been run and as warts tend to be a self-limited nuisance.

DULIN, Iowa City.

THE ORIGIN AND NATURE OF PIGMENTED NEVI (SCHWANNOMAS). S. WILLIAM BECKER, Arch. Dermat. & Syph. **30**:779 (Dec.) 1934.

Becker presents the two theories of the origin of pigmented nevi which still have supporters, namely, the theory of epidermal origin supported by Unna and Block and the theory of nervous origin advocated by Soldan and Masson. His view is based on the study of several hundred sections. Photomicrographs of both the cellular and the nerve type of nevus are given.

DULIN, Iowa City.

A ROUTINE TREATMENT FOR INFANTILE ECZEMA. ALBERT V. STOESSER, Arch. Pediat. **51**:777 (Dec.) 1934.

The routine care of infantile eczema as employed by a rather large pediatric clinic is outlined. The therapeutic measures suggested offer nothing new in the treatment of eczema.

WADDELL JR., University, Va.

THE HEREDITY OF A CONGENITAL WHITE SPOTTING IN NEGROES. C. E. KEELER, J. A. M. A. **103**:179 (July 21) 1934.

Little is known of the parents or progeny of the patients in the numerous reported cases of congenitally piebald Negroes. A pedigree chart is given for such a family. It is noted that every piebald person is born of a piebald parent who is heterozygous for the piebald character and transmits it usually to one half of the offspring. To biologists a dominant mutation of this nature is of interest in showing the occurrence of an inherited pattern of cutaneous pigmentation similar to that found in other mammals.

BONAR, Salt Lake City.

ECZEMA OF INFANCY AND CHILDHOOD. SAMUEL M. PECK, New York State J. Med. **34**:957 (Nov. 15) 1934.

Peck reports on a study of allergy from the Mount Sinai Hospital, New York. Ninety-three patients with eczema were tested by scratch and patch tests. Patch tests are favored especially for environmental substances. Elimination tests were of practical value only in infants. Twenty-three cases of neurodermatitis disseminata are reported.

AIKMAN, Rochester, N. Y.

THE ACTION OF CONCENTRATED SPLENIC EXTRACT IN CASES OF CERTAIN DERMATOSES (ECZEMA AND URTICARIA) AND OF ASTHMA. P. VALLERY-RADOT and P. BLAMOUTIER, Paris méd. **2**:457 (Dec. 8) 1934.

Among forty-nine patients with eczema treated with splenic extract from which most of the albumin had been removed, twenty-one were cured, in twelve improve-

ment was noted, in eight results were inconclusive and in eight no benefit resulted. Among thirty-five patients with urticaria there were eight complete cures, and in seven improvement or temporary benefit was noted. Among seventeen patients with asthma, four showed improvement, and in two of these there was almost entire relief from asthmatic symptoms.

The authors offer no explanation of their results but restate the theory of Schiff, that the spleen secretes an enzyme which changes trypsinogen into trypsin, and that of Paul, that eczema is caused by a defective metabolism of albumin due to insufficiency of the aforementionod enzyme. Introducing splenic extract into the circulation makes up for this deficiency.

LESLIE, Evanston, Ill.

HEMANGIOMAS AND LYMPHANGIOMAS: RESULTS OF TREATMENT. G. GERLACH, Beitr. z. klin. Chir. **159**:129, 1934.

Gerlach studied all cases observed by him between 1918 and 1933 in order to learn what method of treatment was preferable not only from the standpoint of elimination of the condition but also from that of the cosmetic results.

Eighty-four patients were treated, and fifty-one were followed up. Included among these were seventy-one patients with hemangioma, twelve with lymphangioma and one with a combination of both conditions. The hemangiomas were treated as follows: Thirty-four were excised, twenty-nine were treated with radium, two were needled with magnesium, two were punctured, two were treated with injections of alcohol and with radium and one was excised and treated with radium. Treatment of the lymphangiomas was as follows: Seven were excised, two were treated with radium, one was needled with magnesium and two were not treated. The lesion which was a combination of hemangioma and lymphangioma was excised.

Total extirpation left a small scar which faded in late years. Bad results were seldom seen. Treatment with radium gave good results, but from the cosmetic standpoint the results were not as good as those following surgical intervention—scars were more prominent. Pigmentation around the periphery was more obvious in the patients treated with radium. In several severe cases good results were also obtained by needling with magnesium.

RUBIN, Boston.

NAEVUS SYRINGOCYSTADENOMATOSUS PAPILLIFERUS. J. DÖRFEL, Dermat. Wchnschr. **99**:1318 (Oct. 13) 1934.

A 14 year old girl presented on the cheek a small mass consisting of a group of small nodules. It had been present since birth and had increased gradually in size by the development of new nodules. Histologic examination showed a syringocystadenoma. The findings are discussed in detail.

TAUSSIG, San Francisco. [ARCH. DERMAT. & SYPH.]

LIPOPHAGIC SUBCUTANEOUS DIFFUSE GRANULOMATOSIS: A SCLERODERMIC CONDITION. UMBERTO POPPI, Jahrb. f. Psychiat. u. Neurol. **51**:191, 1934.

In a girl aged 13 years there developed, within three months, an extensive scleroderma which was most marked over the trunk and proximal portions of the limbs and spared only the palms, the soles, the pubes and the visible mucous membranes. During the first two weeks after the onset the patient appeared to have slight fever. Biopsy of pieces of skin and muscles disclosed: proliferation of the subcutaneous fat, especially of the uppermost layers; permeation of the muscle with numerous globules of fat; the presence in the deeper layers of the subcutaneous tissue of areas in which the fat had entirely disappeared, of other areas in which it was partly converted into fatty acids and glycerin and of still other areas in which there was normal fat; failure to spare the muscle tissue by the proliferating process, which was especially intense in the layers nearest to the subcutaneous tissue; accumulation of the proliferating elements around the blood vessels,

with no tendency to invade them; poorly stained individual muscle bundles, with indistinct and altered striations; areas remote from the subcutaneous connective tissue in which the proliferations had more of an interstitial character and striking fatty infiltrations between the muscle fibers. The blood vessels in the skin and subcutaneous tissue were almost all surrounded and infiltrated by the proliferating elements; their lumens were often narrowed and in some areas were even obstructed by swelling and increase of the endothelium. Here and there the nerves were also surrounded by the newly formed elements. The proliferating cells were of the nature of histiocytes, polymorphonuclear eosinophilic leukocytes, a few neutrophils, mononuclear eosinophil cells and plasma cells, a few lymphocytes and an occasional clasmatocyte.

Poppi points out that although it is well known that the anatomic picture in scleroderma may vary in different cases and that there is no parallelism between the damage to the skin and the sclerodermal symptoms and also that the sclerodermal process may affect the viscera and bones in addition to the skin and muscles, he is unaware of any case of this disease in which liponecrosis was a feature in the pathologic process. The term liponecrosis is generally employed to designate a saponification of fats which is associated with a proliferating reaction either of the fat cell itself or of the reticulohistiocytic tissue. In view, however, of the lack of unanimity as to the nature of liponecrosis, Poppi would, for the present at least, apply this term to designate only a destruction of fatty tissue which is primary (mostly due to trauma) and in which the proliferating process is secondary. Classic examples of this form, then, would be liponecrosis of the breast (Brancati and Morone), in which there are collections of liquid fat, and the pseudoscleroderma of the new-born (Diss and Woringer and Constantino); in these cases a lipase derived from traumatized fatty tissue acts as a foreign body which produces reactive processes manifested by the appearance of giant cells. In addition to this form, in which fat necrosis is primary, there may also occur, according to Poppi, other forms in which the fat necrosis is the secondary result of a more or less chronic inflammatory reaction of the reticulohistiocytic tissue; this form he would designate as a "lipophagic granuloma," a term which he believes is applicable to the case under discussion. The unusually large extent of the disease, the histologic features of the tissue reaction and the blood picture (mononucleosis and eosinophilia) are all in favor of an involvement of the reticulohistiocytic system, although in the present state of knowledge it is impossible to ascertain the determining cause of the disease. The histologic characteristics of the reaction, which is unquestionably inflammatory, do not aid in clarifying the problem.

The pathogenesis of the sclerodermal condition can be readily explained when one admits that it is a disease of the reticulohistiocytic system which has also affected the collagenous tissues of the skin and subcutaneous structures leading to their sclerotization. The occurrence of granulation tissue seems to confirm this theory.

KESCHNER, New York. [ARCH. NEUROL. & PSYCHIAT.]

RECKLINGHAUSEN'S DISEASE IN OPHTHALMOLOGY. H. KROTKOV, K. GOLUBEVA and S. FIOLETOV, Sovet. vestnik oftal. **5**:248, 1934.

A general examination of the patient is important for a correct diagnosis of Recklinghausen's disease. Two cases are reported.

CASE 1.—A man, aged 29, suffering from epilepsy, had general neurofibromatosis. There were 255 nodules and pigmented moles situated mostly on the chest, abdomen, buttocks and upper extremities. The size of the nodules varied from that of a pinhead to that of a large tumor 14 by 9 cm. There were three nodules on the right upper lid, 3 by 4 cm. in diameter, of a typical coffee and milk color. The patient died during an epileptic attack. The autopsy showed degeneration of the heart muscle, enlargement of the spleen and nephrosclerosis. The histologic examination of a cutaneous nodule showed extensive fibromatous growths. On the slides stained by Weigert's method, nerve fibers were seen in the skin; some had lost the myelin sheath; some were atrophic. At places there was abundant cellular tissue wth oblong or oval nuclei.

CASE 2.—A boy, aged 12, had a diffuse tumor of the right upper lid and temple. The upper lid was thickened, and the tumor covered the palpebral tissue. The eye and orbit were normal. The lid remained ptosed after the operation for removal of the tumor. Under the microscope there were found, as in the first case, nerve fibers. There was an abundance of connective tissue. Palisading of the nuclei was observed, indicating that the origin of the tissue was Schwann's membrane; it also was stained yellow by Van Gieson's method.

The etiology of Recklinghausen's disease is discussed. The difficulty of the diagnosis is demonstrated in the reports of two more cases in which the condition was clinically diagnosed as Recklinghausen's disease, but which microscopic examination proved to be simple fibromatosis.

SITCHEVSKA, New York. [ARCH. OPHTH.]

Surgery and Orthopedics

TREATMENT OF EMPYEMA BY AUTOPYOTHERAPY. G. POPOVISCIU and J. TOMA, Rev. franç de pédiat. **10**:640, 1934.

This article consists of a discussion of the various methods of treating empyema in infants and young children. The authors have employed a modification of the method of Makai, which consists of the subcutaneous injection of small quantities of the pus aspirated from the pleural cavity. The modification consists in the repeated intramuscular injection of larger quantities (as much as 10 cc.) of the aspirated material. They report ten cases and believe that their results are better than could be expected from other methods of treatment. The majority of these were cases of pneumococcic empyema, and the condition might well have cleared up with repeated aspiration alone. It is difficult to judge the reliability of the advocated procedure from such a small series of cases.

LESLIE, Evanston, Ill.

VERTEBRAL OSTEOMYELITIS. B. TASSOVATZ, Rev. franç. de pédiat. **10**:671 (Sept.-Oct.) 1934.

Two cases are reported: one of osteomyelitis of the vertebral bodies and the other of osteomyelitis of the vertebral arches. In the first case the condition was accompanied by septicemia (Staphylococcus aureus) and paraplegia due to compression of the cord. Autopsy showed osteomyelitis of the vertebral bodies extending from the third dorsal to the fifth lumbar vertebra, with collections of pus in the paravertebral spaces and in the medullary canal. In the second case there was involvement of the arches or posterior apophysis of the tenth and eleventh dorsal vertebrae. The abscess collected in the posterior space on the fifth day, and recovery occurred following a wide incision. In neither case had the roentgen rays shown any abnormality of the bones. This is unusual, although a shadow showing increased density in the soft tissues may give indication of abscess formation.

LESLIE, Evanston, Ill.

SCOLIOSIS AND ROUND SHOULDERS; THEIR CAUSE AND TREATMENT. MURK JANSEN, Rev. d'orthop. **21**:565 (Nov.-Dec.) 1934.

Jansen's theory places the cause of scoliosis as (1) internal or (2) external. Internally, asymmetry of the two halves of the diaphragm may lead to abnormalities in the shape of the spine, and, externally, the carrying position of the child in the mother's arm may affect the normal curve. Rickets is a predisposing factor. The age at which the scoliosis occurs may alter the form of the resulting cure: The older the child the less the curve; the younger the child the more likelihood of a simple curve rather than a multiple one.

Treatment consists of a combination of plaster bed during the night and a brace during the day. In scoliosis the author uses a brace with the supporting upright placed midway between the spine and the lateral border of the chest. In round shoulders the upright is placed in the midline.

RYAN, Vancouver, Canada.

PATHOGENESIS OF PAINFUL PRONATION IN YOUNG CHILDREN: HOOKING OF THE BICIPITAL TUBEROSITY ON THE POSTERIOR BORDER OF THE LESSER SIGMOID CAVITY OF THE ULNA. MARCEL FÈVRE, Rev. d'orthop. **22**:5 (Jan.-Feb.) 1935.

Painful pronation in the young child is the result of hooking of the bicipital tuberosity of the radius behind the posterior crest of the lesser sigmoid fossa of the ulna. This hooking produces a posterior subluxation of the radial head. Such a condition is possible only in cases in which there is a congenital malformation of the radial head, the head being circular rather than oval.

RYAN, Vancouver, Canada.

REVISION AND REVALUATION OF THE SYMPTOMATOLOGY AND DIFFERENTIAL DIAGNOSIS OF APPENDICITIS IN THE CHILD. EMILIO ROVIRALTA, But. Soc. catalana de pediat. **5**:189, 1932.

Roviralta believes that the marked difference between appendicitis in childhood and that in adults is not considered in most descriptions of the disease. Emphasis is placed on the differences in the blood picture at different ages. In the differential diagnosis, acetonemic vomiting, thoracic conditions and rheumatic infections are of special importance.

WATSON, Elmhurst, Ill.

TWO CASES OF INTUSSUSCEPTION IN INFANTS, REDUCED WITHOUT SURGICAL INTERVENTION. EDUARDO IMBASSAHY, J. de pediat., Rio de Janeiro **1**:393 (Oct.) 1934.

The first patient was a child 1 year old. The invagination had been present for more than forty hours. It was reduced by giving enemas of 500 cc. of water at a height of 2 meters. The second patient was an infant of 8 months. The intussusception reduced spontaneously in the first twenty-four hours. The author regards these results as exceptional and does not wish to be understood as advocating nonsurgical treatment. He simply wishes to show that some intussusceptions may reduce spontaneously in the first twenty-four hours.

SANFORD, Chicago.

FAMILIAL SCOLIOSIS. JULIUS SURÁNYI, Arch. f. Kinderh. **103**:239, 1934.

Three brothers and sisters showed severe scoliosis. In other respects they seemed normal and had received cod liver oil in adequate amounts throughout infancy. There was a history of scoliosis on the father's side of the family. Apparently this is an instance of a familial type of scoliosis.

LEMASTER, Evanston, Ill.

INTUSSUSCEPTION AND INTRAPERITONEAL PRESSURE IN CHILDHOOD. W. OBADALEK, Beitr. z. klin. Chir. **159**:160, 1934.

The author attempts to prove that there is a relationship between the onset of intussusception and increased abdominal pressure in some cases. He presents two cases of intussusception; invagination occurred in one following severe cough and in the other following marked straining during defecation.

He attempts to explain the greater frequency of intussusception in older infants, in boys more than in girls and in children in a good nutritional state. He states that in these cases there is a greater chance of much more increased intra-abdominal pressure than otherwise.

RUBIN, Boston.

MANAGEMENT OF PURULENT PERITONITIS. B. BREITNER, Beitr. z. klin. Chir. **159**:340, 1934.

Breitner gives credit to Havlicek for introducing the technic of artificial irradiation during operation on patients with purulent peritonitis, i. e., exposing the bowel, mesentery and omentum to the light. Havlicek reported no mortality in one hundred and eight cases.

Breitner reported the procedure in ten cases, with two deaths. He wishes to impress the readers that there is some rationale in the technic, especially because it has an advantageous effect on the circulation. Owing to the irradiation, histamine is set free, causing the arteriovenous anastomosis to open. The pressure in the portal vein is thus increased; the minute volume is also increased, the pulse rate falls, and the circulation as a consequence returns to normal in severe cases.

RUBIN, Boston.

TIMELY COURSE OF HEALING PROCESSES IN FRACTURES. E. W. LEXER, Beitr. z. klin. Chir. **159**:372, 1934.

In every fracture, there occur within a very few days necrosis and destruction on the broken end which can be demonstrated roentgenologically. By making injections into the blood vessels in the bone areas of dogs it can be shown that the amount of destruction and atrophy depends on the resorption through the hyperemic vessels around the fracture.

RUBIN, Boston.

PRACTICABILITY OF ROENTGENOLOGY IN THE DIAGNOSIS OF APPENDICITIS. H. KLEINSCHMIDT, Monatschr. f. Kinderh. **61**:115, 1934.

Kleinschmidt studied eight children carefully and concludes that roentgenology is of no value in the diagnosis of appendicitis. In some children in whom the findings were positive the appendix was perfectly normal on operation, while in the others, with normal roentgen findings, the appendix was found to be diseased.

GERSTLEY, Chicago.

SURGICAL ORTHOPEDIC TREATMENT OF A PARALYZED FOOT. JOVCICA, Pedjatrja polska **14**:59, 1934.

This paper was read at the Slavonic Congress of Orthopedists.

From the author's standpoint, the transplantation of the muscles gives favorable results. The author next discusses the results of arthrodesis of the Putti type and Toupet's type. He performs these operations with modifications of Nové-Josserand and Michels, with very good results. As regards the del Torta method, he cherishes the hope that it will be the method of choice in the future, if at the same time a muscle transplantation is performed. The author has discontinued the use of triarthrodesis; however, once in a while he performs double arthrodesis (Delounoy-Ducroquet).

KRUPINSKI, Chicago.

EOSINOPHILS AFTER OPERATIONS. L. ELSBACH, Nederl. tijdschr. v. geneesk. **78**: 4527 (Oct. 6) 1934.

Elsbach summarizes his article as follows:

About six hours after operation some important modifications appear in the blood picture, of which the most constant is a decrease or disappearance of eosinophils in the thick-drop preparation. This hypo-eosinophilia or aneosinophilia is also found in other conditions in which tissue destruction is an outstanding feature (combustion, fractures). In analogy with the hypo-eosinophilia or aneosinophilia found in infectious diseases, which is considered as a symptom of general intoxication, the author assumes that after operations a condition of intoxication also occurs, caused by resorption of products of tissue destruction

from the field of operation. The most serious form of this general intoxication is what is called surgical shock. In consequence of this assumption he considers blood transfusion as the most efficient means of combating this intoxication, which eventually becomes surgical shock, as the toxic products absorbed from the field of operation are held to circulate in the blood.

VAN CREVELD, Amsterdam, Netherlands.

INTESTINAL INVAGINATION IN CHILDHOOD. L. O. CHRISTENSEN, Ugesk. f. læger **96**:1229 (Nov. 15) 1934.

In a series of fifty-two cases, thirty-four in boys and eighteen in girls, the mortality was 16.6 per cent. Reduction of the invagination by nonsurgical means is indicated in early cases, particularly during the first year of life. Christensen states that, while the importance of early operation has been emphasized, the handling of intestines is of no less importance. The consensus seems to be in favor of the surgical treatment as the method of choice.

ELGHAMMAR, Chicago.

Miscellaneous

A DEVICE FOR THE CONTROL OF THE HANDS IN FACIAL ECZEMA AND THUMB-SUCKING. FRANK VAN DER BOGERT, Arch. Pediat. **51**:810 (Dec.) 1934.

A simple home-made contrivance for the control of the hands in facial eczema and thumb-sucking is presented. As contrasted with all the devices now in use, the writer believes that the device described has certain advantages. For details reference must be made to the article.

WADDELL JR., University, Va.

IDIOSYNCRASY TO AMMONIATED MERCURY OINTMENT. PAUL HARPER, J. Pediat. **5**:794 (Dec.) 1934.

In this article are the reports of the cases of two infants, aged 20 months and 16 months, who reacted violently to the application of 10 per cent ammoniated mercury ointment to the skin. The reaction consisted of a generalized rash, stomatitis, fever and cyanosis and edema of the hands and feet. Patch tests performed later showed a positive reaction to ammoniated mercury ointment.

LEMASTER, Evanston, Ill.

INFANT MORTALITY AND ITS RELATION TO NORMAL AND ABNORMAL CONDITIONS OF PREGNANCY AND LABOUR. S. MITRA, Indian J. Pediat. **2**:16 (Oct.) 1934.

In 4,446 cases of labor in a Calcutta hospital during the years 1931 to 1933, the infant mortality rate was 2.9 per cent on the first day and 6.3 per cent during the first week, and the total rate was 14.7 per cent if the number of stillbirths are included. The infant mortality rate in cases of normal labor was 36 per cent of the total mortality and in cases of abnormal labor 64 per cent. The mortality rate among infants of the middle class was 23 per cent and among those of the poor class 77 per cent, of the total mortality. The rate was higher for those born of primiparas than for those born of multiparas. The rate for premature births was 8.9 per cent and for those of mature birth 4.9 per cent. It is thought that the mortality rate is greatly influenced by the climatic condition and diseases of the tropics and by the economic condition of the parents.

GONCE, Madison, Wis.

THE HÆMOSTATIC POSSIBILITIES OF SNAKE-VENOM. R. G. MACFARLANE and B. BARNETT, Lancet **2**:985 (Nov. 3) 1934.

The authors report encouraging results with the use of venom of Vipera Russellii, which contains a coagulant that clots rapidly both normal and hemophilic blood. It was used successfully as a hemostatic application after dental extraction and tonsillectomy and produced no toxic effects. A further report on this work is promised.

LANGMANN, New York.

CIVILIZATION'S FOOD AS THE POSSIBLE ORIGIN OF DENTAL DISEASES. T. T. ALKIN, M. J. Australia **2**:501 (Oct. 20) 1934.

Various authors are quoted to show that dental caries develops after the beginning of a modern refined diet and that periodontal disease follows lowered resistance which allows bacterial life in the mouth to take advantage of weakened conditions arising from improper diet. In persons with high resistance due to eating correct foods pyorrhea is impossible. Calcium deficiency of the soil may also play a part in producing deficiency in the diet.

GONCE, Madison, Wis.

FOUR PRINCIPAL TYPES OF SEASONAL CURVE OF DISEASES. P. WORINGER, Rev. franç. de pédiat. **10**:565, 1934.

From his analysis of the seasonal variation of morbidity in different maladies, Woringer arrived at a division into four principal types of curves: the hiberno-vernal, the estivo-autumnal, the hibernal and the estival. He associates these with variations in temperature and in the sun's rays. The first group is by far the greatest in the temperate zone, representing most of the infectious diseases, rickets and spasmophilia. This should be combated by an adequate supply of vitamins, especially during the winter months.

LESLIE, Evanston, Ill.

STATISTICS OF THE GUARDIANS OF NURSING CHILDREN OF THE SOCIETY FOR PROTECTION OF MINORS OF BARCELONA: MORBIDITY AND MORTALITY. JUAN CÓRDOBA, But. Soc. catalana de pediat. **6**:223 (July-Aug.) 1933.

Statistics are given for seventy-one infants in a nursery for children of laboring mothers, all but six of which were breast fed. Respiratory diseases predominated in the winter months and gastro-intestinal diseases in the summer months. Nineteen of the seventy-one children had tuberculosis. Five of the infants died. Education of the mothers is part of the work of the nursery.

WATSON, Elmhurst, Ill.

BREATHING EXERCISES IN THE SCHOOL. E. COMENDADOR, Paidoterapia **13**:579 (Oct.) 1934.

The practice of breathing exercises during the school years is highly beneficial to the health, especially the deep breathing which increases the capacity of the lungs and is undoubtedly a real prophylactic measure against many illnesses. For these reasons, compulsory physical training is necessary in the schools. The author believes that a lowered morbidity rate and a subsequent reduction in the mortality rate would soon follow.

HERRON, Spokane, Wash.

INVESTIGATION OF ILLEGITIMATE PATERNITY. SAMUEL GAJARDO, Rev. chilena de pediat. **5**:605 (Nov.) 1934.

The author points out the grave injustice in the present social order of allowing to go unpunished the denial of paternity on the part of the person responsible for the abandoned child. He regards such persons as enemies of society. Strict laws and coercive measures fixing the responsibility on these persons are advocated and should be, in the opinion of the author, a primary concern of legislative programs.

SCHLUTZ, Chicago.

A Modern Concept of the Infant Welfare Station. Eugenio Cienfuegos, Rev. chilena de pediat. **5**:609 (Nov.) 1934.

The author is of the opinion that the primary concern in health supervision of the infant is with preventive and only secondarily with curative measures. Greater value for the general community lies in the establishment of modest but complete welfare stations than in the erection of sumptuous and pretentious hospitals. This is particularly true for a country in which economic conditions present a pressing national problem.

Schlutz, Chicago.

Prenatal and Postnatal Care (the Two Puericultures). N. Palacios Costa and F. Escardó, Semana méd. **2**:929 (Sept. 27) 1934.

The authors use the term *puericultura,* which can literally be translated into English only as "prenatal and postnatal care," although they define it as the science which promotes the conservation and improvement of the human race. The knowledge necessary for the physician, on the one hand, and that for the layman, on the other, with stress on the importance of proper education of the parents, compose the main topic of the paper.

Herron, Spokane, Wash.

Studies on the Pharmacologic and Pharmacodynamic Reactions in Childhood: II. The Dosage of Strychnine. E. Kramár and S. Blazsó, Arch. f. Kinderh. **103**:142, 1934.

The effects of various doses of strychnine on infants and children were studied. The studies were made from three angles: first, the dose of strychnine needed to cause an increase in the strength of the reflexes; second, the amount of strychnine required to cause a change in the electrical irritability of the muscles, and third, the largest dose tolerated without signs of injurious effect. The amount of strychnine which just causes an increase in the strength of the reflexes is suggested as the full therapeutic dose, and the following values were determined: for infants aged from 1 to 5 months, from 1.5 to 2.5 mg. daily by mouth (divided into three doses); for older infants, from 3 to 4 mg. daily; for small children, 5 mg. daily, and for school children (aged from 6 to 13), from 10 to 13 mg. daily. These doses are suggested when the full effect of strychnine is desired (as in cases of paralysis and circulatory weakness); for other uses, however, from two thirds to three fourths of the dose is recommended.

LeMaster, Evanston, Ill.

Dangers of Chemical Contraceptives. K. E. Fecht, München. med. Wchnschr. **81**:1764 (Nov. 15) 1934.

Physicians should not advise the use of contraceptives unless a pregnancy would be detrimental to the health of the woman. The author points out that the welfare of the individual should never be considered at the expense of the nation. At some time the country will no longer be able to stand a decrease in the birth rate. However, chemical contraceptives may also be detrimental to the woman. Prolonged use may cause injury of the mucous membrane of the vagina and uterus, resulting in various pathologic conditions. The spermatozoa may be damaged, and although they are viable enough to fertilize the ovum, the result may be the development of a defective child. The author described two cases in one of which there were physical defects and in the other both physical and mental defects which he believes were definitely due to the use of contraceptives. In the defective development in three other cases the author thinks the use of contraceptives was a contributing factor.

Brahdy, Mount Vernon, N. Y.

Society Transactions

UNIVERSITY OF MICHIGAN PEDIATRIC AND INFECTIOUS DISEASE SOCIETY

Fourteenth Annual Meeting, Ann Arbor, Mich., Nov. 22-23, 1935

DANIEL BUDSON, M.D., *President*

D. MURRAY COWIE, M.D., *Secretary*

FURTHER OBSERVATIONS ON UNDULANT FEVER IN CHILDREN, WITH REPORT OF AN UNUSUAL CASE. DR. JOHN F. SANDER, Lansing, Mich.

A short review of the history of undulant fever is given, with a more comprehensive review of the more recent literature. This is followed by the report of a 23 month old girl for whom a diagnosis of undulant fever was made. The presenting symptoms were largely gastro-intestinal and consisted of intermittent attacks of diarrhea and vomiting. The stools during the attacks consisted largely of mucus. The patient also presented a dermatitis consisting of large macular areas resembling hives. In addition she showed extreme irritability compatible with irritation of the central nervous system. The diagnosis was arrived at by eliminating all other possible infections, by the development of a possible cutaneous reaction to a vaccine prepared from Brucella and by agglutination against Brucella abortus to the titer of 1:640. Phagocytic activity was negative. Intensive treatment was started with brucellin and continued until phagocytosis was marked. The child was entirely free from all troublesome symptoms at this point. Several subsequent examinations during the past year revealed continued high phagocytic activity and continued good health.

DISCUSSION

DR. J. C. MONTGOMERY, Detroit: I should like to have Dr. Sander's opinion about the specificity of the cutaneous reaction in undulant fever. There seems to be a wide diversity of views on this subject.

DR. JOHN F. SANDER, Lansing, Mich.: I agree that there is a great deal of controversy about the specificity of the cutaneous reaction. In order to arrive at a definite conclusion the clinician must use all three parts of this laboratory diagnosis: a skin test that indicates the allergic reaction of the subject, the polymorphonuclear cells, phagocytic activity and, finally, the agglutination test. If the subject has a positive cutaneous reaction it does not mean that he is suffering at the time from undulant fever, any more than a positive tuberculin reaction means that the subject is suffering from active tuberculosis. However, if one finds in a person who is sick a positive cutaneous reaction combined with negative phagocytic activity, one has fairly good evidence of active undulant fever. The agglutination reaction, which is generally considered the most needed in making a positive diagnosis, is negative in a great many cases in which children are concerned. Huddleson pointed out how often this is true.

So, as has been pointed out, it is many times extremely difficult in any case to arrive at an indisputable diagnosis unless the agglutination titer is fairly high. When to consider the reaction positive is another point for discussion. This is particularly true for children, in whom a high agglutination reaction is found with great infrequency.

DR. DANIEL BUDSON, Detroit: Private practitioners often see children with prolonged low grade fever. They always look for undulant fever in these cases but never find it. Is it a waste of time to look for undulant fever in patients with a low temperature?

DR. JOHN F. SANDER, Lansing, Mich.: Children vary so much that there is no single symptom, whether severe or not, by which one can rule undulant fever in or out. The symptoms mentioned should always suggest undulant fever to the mind of the physician, but they are an inadequate basis on which to make a positive diagnosis. The diagnosis is entirely dependent on laboratory findings and exclusion studies.

CALCIFIED ABDOMINAL GLANDS IN CHILDREN. DR. CLEMENT A. SMITH, Boston.

The child with vague abdominal pain is often a difficult problem in regard to diagnosis: moreover, the child with a tuberculous lesion is almost always a problem in regard to prognosis and management. The combination of these problems in the entity of calcified abdominal lymph glands has presented itself so often at the Children's Hospital as to make investigation of some interest. In collaboration with Dr. Ames, I have been studying the records of this hospital for the past ten years. Our material includes a total of 147 ward and clinic cases. The present status has been determined in 131.

One detects these children in two ways: by giving the tuberculin test to all children with obscure abdominal symptoms and by taking a flat roentgenogram of the abdomen, in addition to the usual procedures carried out in studying the child with a positive tuberculin reaction. Roentgenograms of the abdomen show calcified glands in from 1 to 2 per cent of children over 2 years of age. Tuberculosis appears to be the cause in the great majority of cases; the tuberculin test has given positive results in all the members of this group to whom it was applied. From one to more than twenty glands may be involved; these usually occupy the right lower quadrant.

Household contact with pulmonary tuberculosis was the definite background in only 9 patients; in a much larger number contaminated milk was the factor. A history of feeding raw milk was obtained in more than two thirds of the patients for whom information was secured on this point.

Our data show roentgen evidence of associated thoracic lesions in 13.8 per cent of the cases and associated nonthoracic tuberculosis in 17.6 per cent, lesions of cervical glands being most frequent. Two patients had tuberculous meningitis at the time that the abdominal calcification was discovered, which was apparently not due to glandular lesions.

In 1 instance tuberculosis of a hip developed after the diagnosis of calcified glands was made. No pulmonary tuberculosis developed. Thus the outlook need not be particularly guarded. Meningeal dissemination from an associated lesion must be remembered.

Seven children who had tuberculous peritonitis were not considered in the total number because of difficulty in attributing their symptoms entirely to the glands. Sixty-nine never had symptoms, and 71 had symptoms which could be explained only by the presence of involved glands. Most children were subjects of study on the ward, and many were repeatedly seen. That the glands were definitely associated with their disorders we have no doubt.

The most common symptom was abdominal pain; this was present in all but 8 patients. The pain was typically recurrent at intervals of from days to weeks over long periods; often the attack followed physical exertion. There was usually no relationship to meals. Vomiting was infrequent. The pain was sometimes so severe as to make the child double up and cry out. Many children were sent to the clinic because it was thought that they might have acute or chronic appendicitis. Between attacks they were seemingly well and strong, not undernourished, easily

fatigued or anemic. In the 8 who had no abdominal pain, miscellaneous symptoms, such as hematuria, frequency of urination, nausea and backache occurred. Efforts to find any other etiologic factor failed.

For the asymptomatic patients we have urged good hygiene and a safe milk supply. When symptoms are present the following regimen is carried out: (1) Enough rest to cause a cessation of attacks. This varies from a month in bed to half an hour's rest before and after meals. It is often surprising what a very little rest will do. A good diet and exposure to sunlight are probably of value. (2) After six months, patients not benefited by medical care are good candidates for surgical procedure. Their lesions have had time to become inactive, so far as tuberculous infection is concerned. As many involved nodes as possible should be removed. This may be a difficult job. Emergency operations have not often been justified or necessary, though the literature contains a few reports of acute complications demanding them. Among our 71 children with symptoms, the lesions in 57 (80.3 per cent) cleared without operation; the remaining 11 patients (15.5 per cent) still show some symptoms. In 1 of these operation may be performed.

DISCUSSION

DR. M. COOPERSTOCK, Marquette, Mich.: I have observed in upper Michigan a number of interesting cases of calcification of the various glands. Indian children seem to be particularly susceptible. Dr. Smith has assembled a fine series of cases. About how many have you observed in Boston?

DR. CLEMENT A. SMITH, Boston: About 140. More instances are being collected.

DR. M. COOPERSTOCK, Marquette, Mich.: Children who have had tuberculous glands often show roentgenographic evidence of calcification in the neck, chest and elsewhere. I have seen 2 patients with calcification of the axillary glands. Apparently, generalized calcification is not common. There is no doubt that these glands can cause symptoms. I once saw a child with tuberculosis of the kidney who had very large calcified glands along the spine.

DR. E. A. WISHROPP, Detroit: What specific routine preparation do you carry out in your roentgen examinations? Do you make them as a routine, whether pain is present or not?

DR. DANIEL BUDSON, Detroit: There are, of course, a great many children with abdominal pain who do not have tuberculous glands in the abdomen. In a city like Detroit, where there is pasteurization of milk, one sees little of this type of tuberculosis. The cases that we do observe can usually be traced to country homes where unpasteurized milk from the families' cows is used.

DR. CLEMENT A. SMITH, Boston: We use no especial technic in taking roentgenograms. We used to take lateral roentgenograms until we found that they always showed the same picture—the glands just in front of the spine. We do not prepare the children unless shadows are suggestive of some other condition. Then we give an enema, and take another roentgenogram. Routine roentgenograms of the abdomen, as well as roentgenograms of the chest, are now taken in our clinic for children who have a positive tuberculin reaction with or without symptoms. Calcified axillary glands are rare. I do not know of any that we have observed.

I am much interested in Dr. Cooperstock's cases. The fact that such glands occur in Michigan shows that they can appear even when pasteurized milk is used. We have seen several infected children who came from families who used very fine raw milk. Milk under the best conditions may transmit infection to children unless it is boiled or pasteurized.

The tuberculin reaction is always positive in patients with calcified glands. I have tested some patients ten years later and found it still positive. The condition is probably just rare enough so that one may never see it. It may

be of some help to bear this in mind when one sees a child with abdominal pain which one cannot diagnose.

OBSERVATIONS ON THE USE OF ADULT SERUM AS A PROPHYLACTIC MEASURE IN MEASLES. DR. PARK S. BRADSHAW, Ann Arbor, Mich.

Debré and Joannon have shown that the maximum concentration of antibodies in convalescent measles is reached on from the seventh to the tenth day after the fall of the temperature. After this a gradual decrease in the antibody strength of the blood occurs until a point is reached where it remains comparatively constant. Adult immune serum gives equal results if larger doses are given in the ratio of 5:1; that is, from 30 to 40 cc. of adult immune serum accomplishes as much as from 5 to 10 cc. of convalescent serum. The age and size of the child, the day of incubation, the intensity of the exposure and the potency of the serum have to be considered. Attenuation rather than protection is obtained by a small dose given early in the incubation period or a larger dose given late in the incubation period.

Although hospitals are far from ideal places for studies in prophylaxis, because of the uncertainty of exposure of all the susceptible subjects, my co-workers and I thought it worth while to report the results of our endeavor to immunize the entire children's division of the University Hospital in the 1935 epidemic of measles, the largest ever reported in Michigan, according to statistics of the state department of public health.

Blood from immune donors was citrated and centrifugated, and the serum was pooled and preserved with a 1:10,000 solution of merthiolate. Every inpatient between 6 months and 14 years of age was given an intramuscular injection of 15 cc. within forty-eight hours after entering. If measles developed in a ward, all patients who had not had serum within two weeks were given second injections. A few patients did not receive serum because of overnight hospitalization or critical illness or because of a specific request from another department. The recommended dose of serum (from 20 to 40 cc.) was not used because of the expense and because we felt from past experience that the smaller dose of 15 cc. would be sufficiently efficacious.

From Feb. 1 to June 30, 1935, 2,460 children were admitted to the hospital. Measles developed in 65 after a continued stay in the hospital of two weeks or more. The amount of serum given was 38,040 cc., in doses of 15 cc. (average). The average number of injections per patient was two; the maximum, six. In those in whom measles developed there was usually a direct correlation between the severity of the disease, the amount of serum used and the interval after exposure. In the majority of cases of measles in those who received serum the disease was extremely mild; Koplik's spots were absent, and complications did not occur. In many cases the disease would not have been recognized had it not been for the knowledge of the epidemic. In a few the condition ran the typical course of measles in spite of the serum, and the disease was mild in several children to whom serum had not been given. We believe that the serum definitely diminished the number of children in whom measles developed, attenuated the condition in the great majority of those in whom this disease did develop and prevented complications in children with subnormal resistance.

ENCEPHALITIS AS A COMPLICATION OF MEASLES. DR. LOUISE SCHNUTE, Ann Arbor, Mich.

The occurrence of lesions in the central nervous system as a complication of measles was first described by Lucas in 1790. About 200 cases have been reported since 1924.

The disease appears to be a definite clinical entity. The complication is most common in children from 2 to 8 years old. The onset is usually rather sudden, occurring within twenty-four hours on about the fourth day after the rash has

appeared. The usual symptoms are drowsiness, stupor or convulsions. There may be irritability, restlessness, anorexia or emesis. The child is frequently comatose, has a slight fever and presents a variety of neurologic signs which may vary from day to day. Examination of the spinal fluid is of little or no help in making a diagnosis.

The lesions in the brain which were noted in cases 7 and 8 consisted mainly of a perivascular proliferation formed especially of microglial elements. The lesions involved the white matter chiefly but were also found in the gray matter.

The prognosis for life is good, and the mortality is only about 10 per cent. Unfortunately, many of those who survive show permanent nervous symptoms, chiefly spastic paraparesis, hemiparesis, cerebellar ataxia and mental defects. There are no late sequelae such as are seen in epidemic encephalitis.

The ages of the 9 patients were 3, 4, 5, 6 and 7 years. The various symptoms and signs were: pain behind the right ear, in the knees and in the right lower part of the abdomen; stiffness of the neck and back; irritability, flightiness, headache, general and clonic convulsions, twitchings, anorexia, coma, stupor, muscular weakness and normal or hyperactive reflexes or absence of reflexes. The spinal fluid showed normal pressure in 6 cases, a pressure of 110 mm. of mercury in 1, and slightly increased pressure in 1. The fluid was clear in all but 1 case. The cell count was 0 in 6 cases, 3 in 1 case and 35 in 1. The chloride content varied from 60 to 72 mg. per hundred cubic centimeters; the sugar content, from 51 to 68 mg. The chloride content of the blood varied from 420 to 460 mg. per hundred cubic centimeters; the sugar content, from 86 to 124 mg. Recovery was complete in 7 patients; 2 died. Autopsy performed on these showed advanced destruction of the white matter and perivascular lesions in the gray matter in one and many perivascular lesions in the white and gray matter in the other.

DISCUSSION

DR. J. C. MONTGOMERY, Detroit: Apropos of the idea that there may be some known specific virus in all cases of encephalitis, there have been some cases of a condition suggestive of encephalitis following mumps in which the encephalitis was the only manifestation of mumps.

DR. LOUISE SCHNUTE, Ann Arbor, Mich.: The time of onset varies somewhat, particularly after chickenpox. It is unusual to see encephalitis until the twelfth or fourteenth day.

DR. J. C. MONTGOMERY, Detroit: The spinal fluid findings vary widely in the different types of encephalitis. In encephalitis following mumps there is considerable change in the spinal fluid; in encephalitis chickenpox and measles much less change occurs.

DR. LOUISE SCHNUTE, Ann Arbor, Mich.: It seems to me that there may be a specific virus in each case.

LÜCKENSCHÄDEL OF THE NEW-BORN. DR. HAROLD B. ROTHBART, Ann Arbor, Mich.

Lückenschädel is an anomaly of the skull found in the new-born, occurring in association with spina bifida and meningocele or, occasionally, encephalocele. It is characterized by defects on the inner surface of the skull in the form of depressions, shallow or deep, which may extend to the outer surface, being then covered only by a thin layer of bone. These depressions vary in size, contour and number and are seen more commonly in the frontal and parietal plates but may also be present in the occipital bones. When one looks through such a skull the thinned-out areas appear translucent, lined by dura and bordered by thick interlacing ridges of bone.

The clinical diagnosis is established by roentgen studies. There are a general diminution in the thickness with a delay in ossification of all the flat bones. The volume of the cranial cavity may be increased, normal or even decreased, giving

the picture of microcephaly. The most striking feature is the variation in density of the skull cap, consisting in irregular patches of rarefaction or lacunae with interlacing ridges of increased density confined mainly to the parietal and frontal plates. The base of the skull and the long bones show normal development. Increased digital markings may be confused with *Lückenschädel,* but in the former condition the skull is uniformly involved. The indentations are more regular and diffuse and are not as deep as in *Lückenschädel,* and there is no distinct ribbing.

The etiology of *Lückenschädel* is not clearly understood. It is suggested that the meningeal sac depletes the subarachnoid space of its normal fluid, permitting a firmer contact between the brain and the inner surface of the skull, which results in ischemia and nutritional atrophy of the membranous bone. Increased intracranial pressure plays a secondary rôle, enhancing the formation of the defects. Many regard increased intra-uterine intracranial pressure as the sole etiologic agent, pointing out in support of this contention that *Lückenschädel* develops only in fetal life. This is true to a certain degree, and roentgen examination of the fetus in the latter months of pregnancy has revealed the presence of *Lückenschädel.* To indicate that the increased pressure is not the only etiologic factor, evidence is available which shows that in some cases the surface of the brain has undergone little or no morphologic change, which one would expect to find with increased intracranial pressure. Congenital hypostasis is a possibility, and the fact that not infrequently other congenital anomalies are found would strengthen such a possibility.

In the past year 7 cases of *Lückenschädel* were observed in the pediatric service of the University Hospital, showing that the entity is not as rare as the scarcity of material on the subject in the American literature would lead one to believe. Synonyms for this type of skull are lacunar skull, trabeculated skull, blister skull, relief skull, and *Leistenchädel.*

DISCUSSION

Dr. V. C. Johnson, Ann Arbor, Mich.: Dr. Rothbart has shown that this condition is probably more common than has previously been suspected. I have read monographs on the subject which lead one to believe that the condition is rare, since they report only isolated cases. In view of the fact that recent reports would point to increased intracranial pressure as the important factor in *Lückenschädel,* it was interesting to hear Dr. Rothbart amplify developmental disturbances rather than increased intracranial pressure.

Dr. Harold B. Rothbart, Ann Arbor, Mich.: Dr. Johnson, of the x-ray department, helped me considerably in the preparation of this paper. In fact, he was the first to draw my attention to *Lückenschädel.* I am sure that if all newborn infants with spina bifida were subjected to roentgen studies many more cases of *Lückenschädel* would be detected.

Encephalography in Infants and Children. Dr. John L. Law, Ann Arbor, Mich.:

This article will be published in full in a later issue of the American Journal of Diseases of Children.

The Status of Endocrine Research in 1935. Dr. E. A. Sharp, Detroit.

Efforts directed toward chemical identification of elusive incretory factors have met a full measure of success during 1935. In the past an outline has been used to illustrate the annual progress of this phase of endocrine research. At the close of this year, however, several divisions of this outline have expanded to such an extent that it is no longer possible to present all these data in an abridged form.

Except for the unfulfilled prediction that the adrenal cortical hormone would become available in crystalline form, there has been no substantial change in any

bracket of the 1934 outline until the gonad comes under consideration. The chemical synthesis of androsterone by Ruzicka last year and the report by Doisy in 1935 that estradiol is elaborated by the ovarian follicle of swine have given great impetus to chemical research. As the male sex hormone has been isolated from urine and the testes (bull), as well as synthesized from cholesterol, other derived male gonadal substances have followed in profusion. Di-hydro-androsterone and dehydro-androsterone, androstanone, androstenediol, androstenedione and testosterone are among the male sex hormones that have been described.

The corpus luteum hormone was obtained in crystalline form in 1935 and has been named progesterone.

The synthesis of hormones of the male and female gonads, from the sterols prompts the remark that cholesterol is probably the mother substance from which all the known sex hormones are derived.

The newer knowledge concerning the chemistry of hormones, particularly that concerning the chemistry of the gonadal principles, warrants the belief that practical methods of synthesis will follow shortly which will make available to the experimenter and practitioner a substantial number of improved endocrine preparations.

A Comprehensive Review of the Literature on the Use of Iodized Salt in the Prophylaxis of Goiter. Dr. Harry Towsley, Ann Arbor, Mich.

The Greeks in the time of Hippocrates, the early Chinese and the South American Indians are said to have used the ashes of burnt sea weed for the prevention and treatment of simple goiter. Coindet, in 1820, first used iodine knowingly. H. Eggenberger, of Herisau, stated that iodized salt was in use in 1838 for the treatment of goiter. Grange, of Geneva, in 1840, used salt with 1 part of potassium iodide to 10,000 parts of sodium chloride to prevent and to cure tumorous enlargements of the thyroid. This method was discarded after the suggestion of Rillet, of Geneva, in 1858, that there were possible dangers from the use of iodine. In 1860 one of the departments of France used a salt containing from 0.5 to 1 Gm. of potassium iodide to 1 Kg. of sodium chloride, which was thought to be too strong and was discontinued.

The farmers of southern Michigan, in 1870, unknowingly made one of the first successful practical attempts in the prevention of goiter when they gave crude salt obtained from a certain district to their sheep. This salt later proved to contain iodine. The result was the starting of a healthy breed of animals whereas the previous breed had become inferior (Kimball).

From 1870 to 1909 no systematic effort was made to prevent goiter. During this period Gull's disease was described; Kocher, Riverdin, McKinzie, Murry, Halstead, Baumann and Marine made great strides in determining the physiology of the thyroid and its relation to iodine.

The first systematic effort to prevent goiter in fish was carried out in the fish hatcheries at Shady Grove, Pa., from 1909 to 1910, under the direction of David Marine. Very small amounts of iodine were added to the water and solved what had come to be a serious problem of endemic goiter.

In 1916 Marine and Kimball started their epoch-making experiment on the prevention of goiter in man by administering 3 grains (about 0.2 Gm.) of sodium iodide daily for ten days twice a year to the school children of the city of Akron. Klinger, in Zurich, using iodostarine tablets, reduced the incidence of goiter in a group of school children from 90 to 28.3 per cent during a period of fifteen months.

In 1921 H. G. Sloan, in this country, recommended the use of an iodized salt. The Swiss Goiter Commission in 1922 recommended a salt containing 1 part of potassium iodide to 200,000 parts of sodium chloride. On the basis of a consumption of 7½ pounds (3.4 Kg.) of salt per person per year, between 15 and 20 mg. of iodine would be taken. According to Wagner-Jauregg and Bayard, favorable results followed its use.

In May 1924 a salt containing 1 part of sodium iodide and 5,000 parts of sodium chloride was made available to the people of Michigan through the efforts of the Goiter Committee of the Pediatric Section of the Michigan State Medical Society. This salt furnished approximately 7 mg. of sodium iodide a week per capita, or about 12 grains (0.8 Gm.) a year on the basis of the consumption of 8 pounds (3.6 Kg.) of salt a year. This amount had been determined to be harmless from previous experiments. The incidence of goiter in school children in Michigan ranged between 35 per cent in Detroit and 86 per cent in the upper peninsula of the state in 1924. A resurvey of the Detroit city schools, eight years later, showed an incidence of 1.4 per cent.

The incidence of operations for goiter in the state of Michigan has shown a corresponding decrease since the generalized use of iodized salt was instituted (McClure).

A number of articles have been written in disfavor of the use of iodized salt. Many cases of thyrotoxicosis and acne due to iodine have been attributed to it. Such opposition has been on the decline in the past four years. These reports seem to indicate that it was not realized that so infinitesimal an amount of iodine is contained in the maximum per capita year's supply of salt.

PUNCTURE BIOPSY AS A DIAGNOSTIC MEASURE IN THE DIFFERENTIATION OF SOLID TUMORS. DR. D. MURRAY COWIE, Ann Arbor, Mich.

Many years ago Dr. George Dock taught me the value of splenic puncture as a diagnostic measure. I have used the method regularly as an aid in the diagnosis of tumors in the splenic region and finally developed the habit, with certain reservations, of puncturing any solid mass with a small needle for the purpose of studying, by means of stained preparations under a cover glass, the cytologic features of the blood and fluid obtained. It is well known that leukemias, the lymphoblastomas, Gaucher's disease and Niemann-Pick's disease, for example, may be differentiated by this means.

Later my associates and I began to place aspirated puncture material in solution of formaldehyde for fixation and have it stained, blocked and sectioned for microscopic study. By this means we have been able to differentiate tumors and the organs from which they arose. For example, at times when the organ involved could not be differentiated preoperatively by other means tumors thought to be of splenic origin have been shown to be renal tumors.

Puncture biopsy of abdominal masses must be cautiously carried out. Not every mass may be examined in this way. The consistency of the mass may make one fear puncture of a viscus. I can best illustrate the value of puncture biopsy by presenting a few illustrative cases.

CASE 1.—*Tumor in the Left Upper Quadrant of the Abdomen.*—Anna Mae H., 3 years old, entered the hospital on Sept. 16, 1934, because of enlargement of the abdomen which was first noticed a few days previously. There had been no illness until two months before, when pallor was observed, which increased until exhaustion, sleeplessness, anorexia and pain in the left side of the abdomen developed, followed by high intermittent fever and night sweats for the past week. The abdomen was full in the left upper quadrant. There was marked bulging of the flank posteriorly. A firm, hard mass was felt extending downward below the umbilical line and to the right, half-way to the umbilicus. The edge was rounded, and there was no notch. The mass was situated well anteriorly. The fingers could be placed between the ribs and the mass, which moved on respiration. Diodrast showed normal pyelograms. The film seemed to indicate that the left kidney was pushed down by an extrarenal mass.

Puncture biopsy was carried out as follows: A 20 gage needle attached to a 5 cc. syringe was passed well into the mass; the suction was applied, and the needle was allowed to remain several minutes. The small amount of bloody fluid obtained was squirted into solution of formaldehyde, and a few smears were made and sent to the pathologist.

The pathologic report stated that two direct smears were negative. Small fragments of tissue, blocked, showed nests of tall cuboidal cells arranged in small tubular masses and typical gland spaces. Between these islands of neoplastic cells was an abundant amount of recent necrotic processes. The observations pointed to an embryonal carcinoma belonging to the general group of Wilm's tumor. No smooth muscle fibers were seen, and there was no suggestion of splenic tissue. The tumor was probably primary in the kidney.

The postoperative diagnosis was malignant teratoma of Wilm's tumor group, with the glandular elements predominating over the myomatous.

Six other cases were presented. The pathologic reports for these were as follows:

CASE 2.—Dicky C., aged 7 months: The kidney tissue was infiltrated by a malignant neoplasm characterized chiefly by small round cells. It was thought that this might be a Wilm's tumor.

CASE 3.—Betty G., aged 3 years: Small particles of tissue with distinct characteristics of a Wilm's tumor were observed.

CASE 4.—Joyce B., aged 2 years: The material examined was chiefly blood clot. There were small fragments of neoplasm of a very malignant type, adenorhabdomyosarcoma (Wilm's).

CASE 5.—James N., aged 21 months: A malignant neoplasm, chiefly made up of small round cells, was observed. It was thought that this might be a Wilm's tumor. No organ tissue was demonstrated.

CASE 6.—Leona B., aged 7 years: The liver had an increased stroma. Lymphocytic infiltration was present which was strongly suggestive of a high grade of hepatic cirrhosis. The spleen pulp was rich in lymphocytes. The stroma appeared to be somewhat increased. There was one lymphoid follicle and nothing abnormal.

CASE 7.—Elwin O., aged 3 years: Spherical cells with scant cytoplasm and no definite characteristics were demonstrated. The diagnosis of lymphosarcoma rather than that of Wilm's tumor was favored. The growth was a congenital malignant teratoma. No autopsy could be obtained.

RÔLE OF MUCIN IN RESPIRATORY INFECTIONS. DR. W. J. NUNGESTER, Ann Arbor, Mich.

An accidental observation was made several years ago that bacteria injected intraperitoneally with sterilized gastric mucin were more virulent than when injected with a similar amount of an 0.85 per cent solution of sodium chloride. This suggested that mucin in the respiratory tract might possibly, under certain conditions, aid bacteria to establish an infection.

The lower air passages of white rats were inoculated via the trachea with small doses of pneumococci suspended in an 0.85 per cent solution of sodium chloride or solution of mucin. The results of experiments on a large series of animals indicated a marked increase in the mortality in the group that received pneumococci and mucin over the mortality in the group that received pneumococci and saline solution (84 per cent and 13 per cent, respectively). Signs of lobar pneumonia were usually encountered in these animals at death, as well as in animals killed during the course of the disease.

Viscous sputum was also found to aid in producing lobar pneumonia when injected with pneumococci.

As to the mechanism by which mucin aids the organisms in establishing an infection, one cannot be certain. It has been found that mucin aids the bacteria in resisting the cellular defenses of the body both in vitro and in vivo.

Certain treatments have been given to rats after they had been infected with a virulent strain of Pneumococcus and mucin. These treatments included the administration of large doses of atropine, pilocarpine and 50 per cent dilutions of oxygen;

the intraperitoneal injection of fluid (an 0.85 per cent solution of sodium chloride), and roentgen therapy.

These agents were selected more for reason of their bearing on the pathogenesis of the lesions than for their practical therapeutic value. However, it may be stated that none of the treatments reduced the mortality below 73 per cent. Possibly the strain of Pneumococcus used was too virulent to demonstrate the value of treatments such as oxygen therapy that are usually not called on to cope with infections carrying an 80 per cent mortality.

DISCUSSION

DR. D. MURRAY COWIE, Ann Arbor, Mich.: Where do you get the mucin that you use?

DR. W. J. NUNGESTER, Ann Arbor, Mich.: The mucin is commercial gastric mucin such as has been used for ulcer therapy. It is sterilized by being put in a 95 per cent solution of alcohol and boiled for one day; the alcohol is then removed.

DR. D. MURRAY COWIE, Ann Arbor, Mich.: Did you ever try any impure mucin or the secretions from the stomach or nose?

DR. W. J. NUNGESTER, Ann Arbor, Mich.: Sputums from various sources have been tried. In the last experiment, the results of which were obtained this morning, 1 rat was given an injection of pneumococci alone, and 1, of sputum from a tuberculous patient; the third rat received both sputum and bacteria. The first 2 animals revealed no signs of pneumonia when killed, while half a lobe was consolidated in the rat that received both pneumococci and sputum. These results are representative of those obtained in similar experiments.

THE CARBOHYDRATE METABOLISM IN JUVENILE DIABETES. DR. M. COOPERSTOCK, Marquette, Mich.

The trend of recent years toward dietary liberalization in diabetes finds its particular place in children. Broad flexibility in the intake of carbohydrate depends primarily on the factor of exogenous insulin. The capacity for insulin to bring about the metabolism of carbohydrate cannot be represented as a fixed relationship.

In studies on the elasticity of the carbohydrate tolerance in the presence of insulin, abrupt changes in the carbohydrate intake were accompanied by adjustments in the fat content in order to maintain the diet isocaloric. The amount of protein and that of insulin were kept constant.

Under these conditions increase in the carbohydrate content of from 62 to 77 per cent did not increase the total urinary excretion of sugar, in spite of the fact that the patients had been excreting up to 20 Gm. of sugar daily. A return to the former lower levels of carbohydrate intake was not followed by increased glycosuria as a result of the preceding period of relatively higher intake. In one instance an abrupt increase of available dextrose from 155 to 251 Gm. was coincident with an appreciable reduction in glycosuria. An increase in the urinary sugar followed, however, when the carbohydrate intake was lowered to 203 Gm., suggesting an improvement of tolerance on a higher carbohydrate intake. Another patient, who was studied over a longer period, showed that glycosuria of equal degree took place at the relatively high and low levels of 289 and 145 Gm. of available dextrose, respectively. The most efficient utilization of dextrose took place at an intake of 200 Gm. Two severe reactions to insulin occurred in this patient when the intake was more than 200 Gm. Severe hypoglycemic reactions were observed in several other patients with diabetes on relatively high carbohydrate diets. This phenomenon illustrates the excessively stimulating effect on the carbohydrate metabolism that may occur with large intakes of sugar.

Observations were applied to apparent differences in the carbohydrate tolerance within the twenty-four hour period. Children with severe and moderately severe diabetes have notoriously unstable blood sugar-regulating mechanisms, which is

undoubtedly dependent on endogenous factors. Fractional analyses of urine showed a tendency toward greater glycosuria during the night and early morning hours and increased tolerance around midday. The general pattern of the urinary excretion of sugar over the twenty-four hour period was not influenced greatly by abrupt changes in the carbohydrate intake when the changes were so adjusted as to affect each meal equally or made by shifting a considerable portion of the total available dextrose to the noon meal. Giving equal increments of carbohydrate in each of the three meals, with all the other factors being kept constant, likewise showed little influence on the pattern of the urinary excretion of sugar. The diabetic child can utilize these extra additions of dextrose without showing a significant increase in postprandial glycosuria, but the tolerance is less marked when the same amount of dextrose is given at midnight.

DISCUSSION

DR. HAROLD B. ROTHBART, Ann Arbor, Mich.: It is known that tolerance naturally increases with time. Was there possibly this element in your observations?

DR. M. COOPERSTOCK, Marquette, Mich.: I believe that such a possibility was minimized by rapid and significantly great shifts in the carbohydrate content. Experiments of longer duration have been reported.

DR. CLEMENT A. SMITH, Boston: Did you consider giving more frequent doses of insulin and seeing whether this did not tend to level the variations?

DR. M. COOPERSTOCK, Marquette, Mich.: It has been shown by Ellis in England that small doses of insulin given frequently over the twenty-four hour period do produce an improvement in tolerance and tend to reduce the requirements of insulin, at least temporarily. I was primarily interested in studying the variations in tolerance under the conventional methods of administering insulin. Giving insulin at breakfast and supper and a small dose at 9 or 10 p. m. coincides, in many instances, with endogenous fluctuations in the carbohydrate tolerance within the twenty-four hour period. The exact manner in which insulin acts is still unknown. There is considerable variation in its effectiveness. For example, insulin given in the early hours of the morning seems to be more effective than an equivalent amount given later, as has been shown by Möllerström. The chief point that I wish to illustrate in my studies is the considerable flexibility in the amount of carbohydrate which the diabetic child can handle.

DR. DANIEL BUDSON, Detroit: Might not the variation in the excretion of sugar during the night be explained by the lack of exercise?

DR. M. COOPERSTOCK, Marquette, Mich.: That is undoubtedly the accepted belief, and it is true that exercise brings about fleeting fluctuations in hyperglycemia and glycosuria. Some well founded evidence was presented by Soskin and his collaborators that muscular work and conditioning produce no definite improvement in tolerance over long periods. The variations in tolerance over the twenty-four hour period are undoubtedly, in great measure, due to endogenous factors independent of exercise.

THE ADDIS SEDIMENT COUNT IN JUVENILE NEPHRITIS, WITH REFERENCE TO THE EFFECT OF PROTEIN ON THE KIDNEYS. DR. HAROLD B. ROTHBART, Ann Arbor, Mich.

For many years it has been thought that meat is injurious to the kidneys. Although this view is not universally accepted, there is considerable evidence to show that an excess of animal protein is definitely nephropathic. Newburgh and his associates have clearly demonstrated this pathologically in rats and clinically in man. Their investigations led them to conclude that the nonprotein nitrogenous substances—the amino-acids and purines—are nephropathic when consumed in excess. The pure proteins—casein and lactalbumin—are not harmful, and their ingestion in quantities sufficient to meet the body need is without demonstrable

effect on the kidneys. Milk, eggs and cheese may be eaten with impunity. Their content of amino-acids and purine nitrogen is negligible. The rapid growth and development of an infant on an essentially milk diet indicates that this kind of protein is adequate.

Newburgh produced proteinuria, hematuria and cylindruria in a young adult on a diet containing 337 Gm. of animal protein daily, of which approximately 25 per cent was liver, within a period of seven weeks. After the diet was discontinued the urine returned to normal.

In my investigation the effect of an adequate protein diet, containing two-thirds animal protein with as much glandular substance as possible, was noted in 3 children. One was a normal girl of 10; another was a girl of 7 with nephrosis, and the third was a boy of 12 with acute nephritis during early convalescence.

The Addis urinary sediment count was made twice weekly, and the technic followed was similar to that used by Reed and Butler.

A chart indicates that in the normal child the animal proteins produced no changes in the urine, while in the child with nephrosis and the child with nephritis some changes were observed. Although the correlation may be purely accidental, it is interesting to note that in the patient with nephrosis, in which the tubular lesion predominates, there was noted an increase in the number of casts but no increase in the red blood cells, whereas in the patient with nephritis, in which glomerular damage is paramount, the increase was in the red blood count and not in the casts. Such findings are, at the most, only suggestive. However, there was no demonstrable impairment in kidney function, as was shown by urea clearance tests?

Conclusions can hardly be drawn from only 3 cases in which the patients were followed for such a short period. Further work needs to be done to definitely prove or disprove the injurious effect of meat proteins on the kidneys. Until then it would seem that one should take heed in giving animal protein in excess to patients with nephritis or nephrosis, particularly such glandular substances as liver, thymus, kidney and pancreas. Pure proteins are in every respect adequate, and these, together with nonglandular meat on occasions, will supply all the protein requirements of the growing body.

DISCUSSION

DR. L. H. NEWBURGH, Ann Arbor, Mich.: Feeding experiments on animals convinced my co-workers and me that diets containing large amounts of animal tissue are capable of producing serious injury to the kidneys, and that pure protein is not injurious. We were unable to produce injury with any amount of casein or other protein obtainable in pure form. From the effects of nitrogen in nonprotein form it is evident that the injurious features in animal tissue are the nonprotein nitrogenous compounds, not the protein. It is easy to feed any desired amount of protein to any one and still avoid nonprotein nitrogen. Eggs, milk and cheese contain the best type of protein with very little of the injurious nonprotein nitrogen. The problem reduces itself to selection of the right source of protein. In that way one can feed high protein diets which are beyond suspicion.

DR. CLEMENT A. SMITH, Boston: One more type of case is needed to stress the point. Does it not take chronic nephritis of the true glomerular type to prove the contention?

DR. HAROLD B. ROTHBART, Ann Arbor, Mich.: We have a patient with chronic nephritis under observation.

DR. M. COOPERSTOCK, Marquette, Mich.: I am much interested in the remarks made by Dr. Newburgh on the influence of both harmless and deleterious types of high protein diets on the kidneys. Some years ago, in a study of the effects of high protein diets containing high percentages of casein on rabbits, the outstanding picture in the kidneys was marked hypertrophy, which, in the absence of pathologic changes in these organs referable to the diets, we interpreted as a "work" hypertrophy. I wonder whether Dr. Rothbart's observations of renal

hyperfunction, as indicated by high urea clearance, following the institution of a high protein diet is not an indication of a similar phenomenon.

DR. HAROLD B. ROTHBART, Ann Arbor, Mich.: Roentgenograms of the kidneys to detect changes in size were not taken.

DR. JOHN L. LAW, Ann Arbor, Mich.: Would you explain what you mean by a "normal" number of blood cells and casts in the urine?

DR. HAROLD B. ROTHBART, Ann Arbor, Mich.: According to Butler, the normal number of red cells in the urine for the male may range up to 160,000, and in the female, up to 274,000. Butler allows up to 840,000 white blood cells and epithelial cells in the male and about 4,000,000 in the female. The number of casts for both sexes is about 40,000. These estimates vary a great deal. They are based on specimens of twelve hour concentrated urine.

EFFECT OF A GENEROUS BUT UNFORTIFIED DIET ON RACHITIC RATS. DR. C. A. LILLY, Ann Arbor, Mich.

My paper deals with a nutritional question only. Dr. Cowie thought that the observations of my associates and me might be of interest to the members. A final report will be made in the near future.

A large group of young rats (72) were put into a dark room and fed Steenbock's rachitogenic diet no. 2965 for thirty-three days. All the animals showed roentgenologic evidences of severe rickets at the end of that period.

The animals were then divided into four groups. Group I was continued on the rachitogenic diet as a control. Group II was fed the rachitogenic diet to which was added 0.03 per cent by weight of viosterol (containing 10,000 units, U.S.P.X revised 1934, per gram) which cures rickets in rats. Group III was fed the rachitogenic diet to which was added 0.04 per cent secondary phosphorus in the form of sodium phosphate (Na_2HPO_4), which, we have found, cures rickets in rats. Group IV was taken off the rachitogenic diet and fed a generous but unfortified diet which consisted of table leavings (scraps) which contained generous amounts of all kinds of common but unfortified foods. The rats in this group were kept in a dark room in individual cages. Every day each animal was given a large amount of the table leavings and permitted to make its own selection, both qualitatively and quantitatively.

Feeding tests were carried out on all the groups over a period of ninety days. The following results were observed:

All the animals of group I died with clinical and roentgenologic evidences of severe rickets; all the animals of group II were alive except 2; all the animals of group III were alive except 3, and all the animals of group IV were alive. The average weight attained was: group II, 228 Gm., an average gain for each rat of 123 Gm.; group III, 224 Gm., an average gain of 146 Gm.; group IV, 370 Gm., an average gain of 267 Gm. All the surviving animals showed roentgenologic evidences of healed rickets.

The animals were then chloroformed, and their femurs were removed for chemical and microscopic examinations. The amount of ash of the fat-free, moisture-free femurs was found to be as follows: group II, 58.2 per cent; group III, 64.2 per cent; group IV, 64.8 per cent. Microscopic examination of the bones of groups II, III and IV also disclosed histologic evidence of healed rickets.

It was found in this experiment that a generous but unfortified diet of common foods produced roentgenologic, chemical and histologic evidence of healed rickets in rats as great as that produced by standard amounts of vitamin D (viosterol) or sodium phosphate (Na_2HPO_4), as well as much better growth.

Whether these curative effects were due to the vitamin D or the phosphate content of the common foods fed or to the combined effect of both the vitamin D and the phosphates or even to some factor as yet unknown, we are unable to say. We were concerned only with the effect of the generous unfortified diet on rachitic rats and not with the cause of those effects.

This experiment seems to indicate that vitamin D can be substituted for, because 0.04 per cent of secondary phosphorus in the form of sodium phosphate healed the rachitic rats equally as well as did standard amounts of vitamin D given in the form of viosterol. Furthermore, a generous unfortified diet of common foods was found to contain enough calcifying properties to form normal bone and cure severe rickets in rats.

DISCUSSION

DR. D. J. BARNES, Detroit: I must point out that rickets in rats is not the same, so far as it has been possible to discover, as rickets in man. One brings about rickets in rats with a definitely abnormal type of diet, and it is only when one has a very low intake of phosphate or some other disturbance of this sort that one is able to produce rickets at all. If one varies that diet and increases the phosphate in it, rickets does not develop or is cured.

If that impression, which may be wrong, is correct, obviously when one removes the rats from the rachitogenic diet and increases the intake of food one would expect them to be cured.

Viosterol seems to act largely through mobilization of tissue minerals rather than otherwise. It appears possible to produce prompt cures in rats with the addition of phosphate to a hitherto restricted diet. In man the healing of rickets does not go on promptly. My associates and I observed 120 infants 2 months of age or less. We had serial roentgenograms taken. Some infants received carefully controlled amounts of viosterol, and some received cod liver oil. It was our impression that the babies who were given viosterol, while they showed healed rickets, so far as diastases of the bones were concerned, had thinner bones than the group that were given vitamin D in cod liver oil.

I was interested in Dr. Lilly's paper, but I fail to see how his observations would necessarily alter the present ideas about the specificity of vitamin D in its effect on calcification.

DR. DANIEL BUDSON, Detroit: I should like to point out again briefly that pediatricians are aware that viosterol is not as effective in children as the experimental work on animals indicates that it should be. Many pediatricians are switching back to cod liver oil or some of the concentrates. The latter do not seem to be as effective as cod liver oil. One sees rickets even though viosterol has been used. Apparently one can produce rickets in rats even by a superminimal diet, whereas in babies one knows that such a diet does not produce rickets. Rickets is a disease of the growing bone. In the past few years there has been a reaction against viosterol, knowledge obtained by experimental work on rats having been applied to human beings.

DR. V. C. JOHNSON, Ann Arbor, Mich.: When rats fed such an abnormal diet have rickets, perhaps they can get along without additional vitamin D on a diet which is not so atrocious. It is hard to produce rickets in animals, even with a bad diet.

DR. C. A. LILLY, Ann Arbor, Mich.: Rickets in rats is much like rickets in man. Park and other observers in this field regard rickets produced in rats identical with rickets in man. The blood picture is the same. Rickets in animals may or may not be accompanied by tetany. In obtaining the healing of rickets with sodium phosphate we followed all the rules in assaying the vitamin D values of all food and medicinal substances. If one can assay the benefit of cod liver oil by experiments on rachitic rats, why cannot one assay the healing effects produced by sodium phosphate in the same manner?

DR. C. PEIRCE, Ann Arbor, Mich.: Dr. Barnes answered his own question. Children who were given viosterol showed healed rickets but a poor skeleton. If a child is not getting enough phosphorus he will rob his own skeleton, as a pregnant woman robs her own skeleton.

QUESTION: One sees rickets in children who are not growing. I have observed several cases in which rickets would not heal with the administration of vitamin D.

There was associated anemia, and the rickets could not be treated until the anemia was healed.

DR. C. A. LILLY, Ann Arbor, Mich.: The experiment that I reported was performed for the purpose of studying the nutritional effect, not the therapeutic action, of vitamin D. I do not question its therapeutic effect in rickets. I am interested in the part, and only in the part, that vitamin D plays in nutrition.

My quarrel is over the "teaching" that it is necessary to add vitamin D adjuvants to all diets, even to the diets of normal, healthy children, in order to produce normal bone formation and prevent rickets. I do not believe that it is. Furthermore, our rachitic rats were cured when given a generous diet of common foods, without the addition of vitamin D adjuvants, and the animals made their own selection of the foods that they ate, both qualitatively and quantitatively, which forces me to conclude that normal bone can be formed by good generous unfortified diets of common foods. If rachitic rats can be healed by adding phosphate ions to a rachitogenic diet just as well as by adding pure vitamin D (viosterol), as we have found, vitamin D is not a specific indispensable substance, because it can be substituted for.

It should be remembered that cod liver oil contains several substances besides vitamin D. Viosterol is used for experimental studies because it is a pure source of vitamin D, and one cannot have more than one variable in an experiment and attribute the result to one substance.

All that is known about the action of vitamin D has been worked out on the rachitic rat. Children cannot be killed and their bones submitted to the chemist and pathologist in order to obtain definite information as to the effects of vitamin D as supplied in different foods and medicinal materials. Clinical observations cannot be compared with laboratory findings.

DR. D. MURRAY COWIE, Ann Arbor, Mich.: I should like to ask Dr. Lilly whether rachitogenic diet no. 2965 is absolutely free from vitamin D. Is there perhaps just a small amount of this vitamin present? If so, could the cure of the rachitic rats by the addition of sodium phosphate to the rachitogenic diet, be due to "stimulation" of that small amount of vitamin D, which was brought about when the sodium phosphate was added to the rachitogenic diet?

DR. C. A. LILLY, Ann Arbor, Mich.: That is a hard question to answer. There is no chemical test for vitamin D. Therefore, biologic tests must be resorted to. The rachitic rat is the animal of choice for the biologic test.

When a substance fails to bring about a deposit of calcium phosphate in the zones of provisional calcification of the bones of rats previously made rachitic on Steenbock's rachitogenic diet no. 2965, that substance is regarded as free from vitamin D.

If there is any vitamin D in Steenbock's rachitogenic diet no. 2965 or in McCollum's rachitogenic diet no. 3143, it is a very small amount. McCollum regards the amount of vitamin D in either one of these diets as being negligible. It certainly is too small to be detected.

ABDOMINAL TUMORS IN CHILDREN: REPORT OF A SERIES OF CASES. DR. LOUIS M. HARLEY, Ann Arbor, Mich.

This study comprises a survey of 32 cases of Wilm's type of neoplasms of the kidneys observed at the pediatric clinic of the University Hospital in the last ten years. These mixed teratomas incorporate both the sarcomatous and the carcinomatous elements and are referred to as adenorhabdomyosarcomas. The number of cases just cited does not include 2 cases of typical Wilm's type of neoplasms of the urachus and cervical neck of the bladder, respectively. During this entire period not one case of hypernephroma was seen. One tumor, however, showed both sarcomatous and lipoid cells and was considered to hold a somewhat intermediate position between Wilm's tumor and a hypernephroma.

Two thirds of the cases occurred in persons between the ages of 2 and 5 years. The youngest was aged 7 months, and the oldest, 16 years; the distribution according to sex was about equal.

Unfortunately, advanced pathologic changes have already taken place before the symptoms become manifest in this disease. Only 11 patients gave a positive history of urinary disorder (frequency, hematuria and dysuria). In 7 of the cases the child was considered well until a large abdominal tumor was accidently noticed during a routine physical examination. In 6 cases metastasis to the lungs was found on admission. Loss of weight was usually slight. The urinary findings were of no particular aid in the diagnosis. The urine was normal in 11, or 33 per cent, of the cases. The positive findings were usually moderate.

The pyelogram proved to be the best aid in diagnosis. It showed nothing abnormal in 2 of the cases. It usually shows nonvisualization of the affected kidney (the most common finding) or some distortion of the pelvis, varying from faint visualization to grossly dilated calices.

The normal urine is accounted for by the fact that there is no excretion of urine from the affected side. If the tumor is squeezed, considerable sediment showing pathologic urinary findings may be obtained, particularly on cytoscopic examination. If the diagnosis is still uncertain, a test of irradiation should be made. Rapid diminution in the size of the tumor verifies the diagnosis. This is a good procedure, since all patients with this type of tumor should receive both preoperative and postoperative irradiation. Renal puncture is an important diagnostic procedure.

Metastasis occurred in 13, or 40 per cent, of our patients on admission to the hospital. In 4 metastasis developed later, in 2 of these following nephrectomy and irradiation.

Laparotomy was done in 18 cases; in 8 cases the tumor was inoperable. Metastasis to nodes was found in 2 cases. There was no metastasis in 6 patients. Of these, 4 are still well: 2 of these received no roentgen treatment (two years ago); 1 had postoperative roentgen treatment (one and one-half years ago), and 1 had preoperative and postoperative roentgen treatment (six months ago).

OBSERVATIONS ON SENSITIZATION AND THE INTELLIGENCE QUOTIENT. DR. B. JIMENEZ, Ann Arbor, Mich.

Each student entering the University of Michigan is given two so-called intelligence tests. His intelligence is determined by the grade that he receives in an algebra test and an English test. In algebra, standards are arranged for those who have had from one to one and a half or two years' study.

Blanks provided by the health service were filled out by each student. These included questions as to whether there was any family or personal history of sensitization. Eighty per cent of these records were approved by the parents. I have gone over a large series of these records and have arranged the students in four definite sensitized groups, which are given in detail in the complete report.

A careful analysis shows that the students in the sensitized groups received higher marks than those in the nonsensitized group, thus supporting the well known view that allergic persons belong in the more intelligent class. The records of 625 sensitized and 454 control nonsensitized students were studied.

COMPARATIVE YEARLY SURVEYS OF SPECIFIC SENSITIZATIONS IN STUDENTS OF THE UNIVERSITY OF MICHIGAN FROM 1930 TO 1935. DR. B. JIMENEZ, Ann Arbor, Mich.

Of 16,113 histories studied, embracing those of all entering students for the past six years (1930-1935), we have found that 5,624, or 35 per cent, were definitely sensitized and 2,909, or 18 per cent, were potentially allergic. The percentage of sensitized students year after year is almost identical. I believe that 53 per cent of the student body should receive a complete sensitization study from the point of view of preventive medicine.

Comparative Yearly Surveys of Specific Sensitizations in Students of the University of Michigan from 1930 to 1935 *

Group†	1930-1931 Percentage		1931-1932 Percentage		1932-1933 Percentage		1933-1934 Percentage		1934-1935 Percentage		1935-1936 Percentage		Total Average Percentage	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F
1 Eczema, rose fever, hay fever, asthma	10.0	....	11.8	10.7	14.0	13.2	9.50	9.60	11.20	10.70	10.60	13.00	11.14	11.48
2 (*a*) Urticaria; (*b*) gastro-intestinal upsets, food idiosyncrasies, frequent "colds," headaches, etc., with a family history of sensitization	23.7	....	20.6	23.6	22.4	20.7	21.70	27.00	22.40	30.30	23.98	30.10	22.57	26.69
3 Gastro-intestinal upsets, food idiosyncrasies, frequent "colds," headaches, etc. with no family history of sensitization	13.3	....	13.5	9.5	12.0	7.7	13.14	13.59	12.40	9.40	14.50	13.30	13.19	10.78
4 No symptoms so far, with a family history of sensitization	17.9	....	19.3	21.1	17.1	24.0	15.60	16.45	16.87	18.66	18.60	16.68	17.62	19.26
5 No symptoms and no family history of sensitization	34.9	....	34.6	35.1	34.3	34.0	39.90	33.16	37.10	30.70	32.28	26.80	35.45	31.75
Total number of students	1,808	907	1,871	817	1,682	757	1,826	802	2,294	927	2,376	953	11,857	4,256
Percentage	66.4	33.6	69.5	30.5	68.96	31.04	69.48	30.52	71.00	29.00	71.37	28.62	69.66	30.34
													6,088	2,445
													51.3%	57.4%
													8,533	
													52.9%	

* M indicates male, and F, female.
† Groups 1, 2 and 4 are sensitized groups.

INTERPRETATION OF EARLY AND DELAYED INTRADERMAL REACTIONS IN ALLERGIC PERSONS. DR. WILMA SACKS, Ann Arbor, Mich.

The interpretation of cutaneous reactions has long been a subject of discussion among allergists. Of particular interest is the matter of the significance of the delayed reactions: those appearing from six to twenty-four hours after testing. The general opinion is that the immediate reaction is the significant one, but several workers stress the importance of the delayed reaction.

The records of the clinic for allergic patients were studied, the data for a group of 123 patients with hay fever and 127 without hay fever being used. The percentages of the patients who gave early and delayed reactions, respectively, to a selected group of twenty important allergens was determined. These were as follows:

Condition	Percentage of Subjects	
	Early Reaction	Delayed Reaction
Hay fever	85.2	14.8
Asthma (nonpollen)	76.2	23.8
Eczema	85.0	15.0
Allergic rhinitis	75.6	24.4
Urticaria	70.2	29.8
Migraine	59.2	40.8

Brief histories of cases were presented, which showed that in certain instances delayed reactions are clinically significant. In most cases of hay fever they are probably unimportant. This is also true in eczema. We could reach no conclusions as to their value in urticaria. Delayed reactions appear to be especially significant in migraine. In all allergic conditions delayed reactions cannot be ignored.

CIRCULATING ALLERGIC ANTIBODY. DR. D. MURRAY COWIE, DR. MERYL FENTON and JOHN ENGELFRIED, M.S., Ann Arbor, Mich.

The ordinary antibodies found in human blood serum, agglutinins, precipitins, hemolysins, bacteriolysins and opsonins are well known antisubstances that develop in the blood in response to certain stimuli—bacteria, foreign blood corpuscles and other agents. These antibodies can be studied in a variety of ways. If they are of the amboceptor complement structure the complement can be inactivated by heat (from 55 to 60 C.) or separated from amboceptor by exposure to cold (from 5 to 12 C.). Amboceptor is not destroyed by heat, but it can be removed from serum by the process of absorption. There is another antibody which we have thought is separate from those mentioned, the passively sensitizing antibody designated as "ergin" by von Pirquet.

We became interested in investigating the question of circulating allergic antibody—passively sensitizing antibody. It has been thought by many that circulating allergic antibody unites with allergen entering the blood stream, thus preventing, delaying or modifying the allergic response in the so-called shock tissues. Others are inclined to believe that there is no neutralization of, or union between, antibody and allergen in the blood stream and that the mechanism of reaction and resistance to reaction resides in the tissue cells.

In our investigation the skin of persons sensitive to certain allergens was used as the test indicator in one series, and areas of passive transfer in nonsensitive skin were used in another series.

With the first method, numerous observations indicated that no stable union of sensitizing antibody and allergen is effected by incubation of allergen and antibody or by incubation followed by exposure to cold (from 0 to 12 C.). Cutaneous reactions are produced in sensitive persons by treated as well as by untreated allergens. There is no difference between so-called immune and nonimmune persons in this respect. These observations indicate that there is no neutralization of allergen by serum.

Immune or nonimmune allergic serum is not deprived of its sensitizing ability by incubation with allergen or by exposure to cold. No matter how much allergen is added, normal areas of skin can be passively sensitized by such treated serum. This is in accord with the observations of Levine and Coca.

Immune and nonimmune allergic serum deprived of complement and injected into normal skin sensitizes the areas of skin as does unheated passively sensitizing serum. In other words, complement is not necessary for passive cutaneous sensitization.

This is a preliminary report. To those interested in the biologic nature of the allergic antibody these observations may be of interest.

HISTAMINE IN RELATION TO THE INTRADERMAL REACTION TO ALLERGENS IN SENSITIZED PERSONS. DR. D. MURRAY COWIE, DR. WILMA SACKS and JOHN ENGELFRIED, M.S., Ann Arbor, Mich.

In a study of the factors that enter into the production of the intradermal reaction in sensitized persons we became interested in investigating the possibility of preformed histamine's being an excitant. On a number of occasions we have found a certain lot of powdered antigen which, when properly dissolved and made into a test "solution," induced a reaction in almost every suspected allergic skin. When a new powdered antigen was substituted the cutaneous reactions failed to appear. Our first offender was an animal "protein," tuna fish; then pear, beet and corn were found to cause similar reactions.

It is well known that histamine in a very high dilution (1:1,000,000), when injected intradermally, causes a reaction that cannot be differentiated from an allergic reaction by the usual methods of skin testing. If histamine should be a contaminating factor it would more likely be found in animal allergens, particularly in the epidermal group. It is with these allergens that we get our largest reactions.

Histamine readily passes the ultrafilter. Allergic antigens (proteins) do not. If histamine is present in an antigen the filtrate of its solution should give a positive cutaneous reaction when its histamine content is as strong as 1/200,000. It should also give a positive diazo reaction. As there are substances other than histamine that freely pass the ultrafilter and give a positive diazo reaction, this test alone cannot be relied on for detecting its presence. Both reactions are necessary.

We have tested the following allergens for a possible histamine content: horse dander and rabbit hair, representing the epidermals, and ragweed, representing the vegetation allergens. (Alexander suggests the possible presence of a histamine-like substance in the skin.) In brief the results were as follows: Horse dander ultrafiltrate gave no cutaneous or diazo reaction. Rabbit hair ultrafiltrate gave no cutaneous or diazo reaction. Ragweed (short) ultrafiltrate gave no cutaneous reaction but gave a positive diazo reaction.

When histamine is added to allergen and allowed to incubate at 37 C. for one hour, it passes the ultrafilter, almost completely separating from the residue. Although the cutaneous reaction caused by the residue is enhanced by the contained histamine in a sensitized skin, when the residue and filtrate are injected into a nonsensitize skin a reaction also occurs, but the residue allergen alone does not cause a reaction. This shows that the histamine is either adhered to the allergen or has not completely filtered out. We did not wash the residue that had been subjected to the action of histamine. This should be done.

Our observations lend support to the belief that preformed histamine is not a factor in the production of the cutaneous reactions caused by injecting allergens into the skin of sensitized persons.

Book Reviews

Body Water. By John P. Peters, M.D. Price, $4. Pp. 405. Springfield, Ill.: Charles C. Thomas, Publisher, 1935.

Under this title Peters has summarized the present knowledge of the body fluids and the various factors governing their exchanges. While a major portion of the leading papers on the subject are reviewed, the monotony so frequently found in exhaustive, uncritical compilations of literature is avoided. Having spent many years of arduous work in the general field covered, the author is in an authoritative position to offer critical interpretations of the results of experiments. This has given distinctive character to the book. A considerable volume of previously unpublished data is also presented, and some more or less original theories are set forth.

The subject matter included is much more extensive than one might surmise from the title. In fact, water per se receives but minor consideration in comparison with that given to the solutes contained in body fluids. For instance, the theories of alimentary absorption and excretion of both inorganic and organic substances are discussed in some detail. The last four chapters, which comprise nearly half of the book, deal exclusively with the physiology of the kidneys. In the estimation of the reviewer, these four chapters constitute a monograph on renal function which is unsurpassed for up-to-dateness, completeness and clarity. While the theory of filtration and reabsorption is obviously favored over the rival vitalistic theory of special secretion, the point of view expressed is admirably supported by a variety of experimental data which have been contributed by a large number of investigators. The rôle of nervous and hormonal factors in the control of the excretion of urine is given special emphasis, but it is pointed out that other factors are also involved. Any one in search of an authoritative presentation of the subject of urea and creatinine clearances as a measure of kidney function will find the chapter "Renal Excretion of Filtrable Organic Solutes" very illuminating.

Chapter I deals with the chemical forces controlling exchanges of water and solutes across the various specialized membranes which separate the several compartments of fluid of the body. Osmotic pressure is naturally given the place of first importance in this connection. Since the vapor pressure of a fluid is inversely proportional to its osmotic pressure, it is pointed out that the osmotic pressure of the body fluids influences the rate of loss of water by vaporization. Peters considers the special case of the unequal distribution of solutes across a membrane, which is encountered frequently in the living body, in the light of the Gibbs-Donnan equilibrium. The limitations encountered in attempts to apply the equilibrium equations to elementary chemical analysis of extracellular and intracellular fluids are recognized, and adequate reasons for their inapplicability are given. However, since there can be little doubt regarding the validity of the equations when living as well as artificial membranes are involved, the concept is of great value as a criterion in studies on the maldistribution of ions due to the impermeability of such membranes to complex organic substances and to certain basic ions. It is obvious that the necessity for water and diffusible noncolloidal solutes to flow across semipermeable membranes to balance the osmotic forces of nondiffusible colloids and bases creates a constant circulation.

The several compartments of body water are defined according to their anatomic location and their chemical constitution. A general distinction is made between the extracellular fluids characterized by the presence of sodium as the chief basic ion and intracellular fluids in which potassium is the predominant base. By injecting known quantities of substances, such as sulfocyanate, sulfate or sucrose,

which diffuse uniformly throughout the extracellular fluids without entering the body cells, and shortly afterwards determining their concentration in serum water, Lavietes was able to show that these fluids constitute about 20 per cent of the body weight in man. Darrow and co-workers found this value to be about 28 per cent in rabbits. Much of the first half of the book is devoted to a discussion of the variations in composition of the different compartments and subcompartments under different conditions and to the forces involved in exchanges between them. The nature of lymph and the factors involved in its movements are thoroughly discussed. In the discussion of the interchanges between the blood capillaries and the interstitial reservoir, the essential factors in the mechanism of edema formation are presented. However, edema is not discussed in detail from the clinical or the pathologic point of view.

In the chapter on exchanges between blood cells and serum, the balance between acid and base factors receives special consideration. In addition, the newer knowledge regarding the state of the bicarbonate in the cells and the recently modified theories of carbon dioxide transport and exchange are reviewed. Reference is also made to the alleged lipoid-chloride combination, which, like some of the bound carbonate fractions, may be of considerable importance in explaining the presence of an excess of acid over base radicals in both the serum and the cells.

A chapter on water of oxidation and the losses of water and solutes through the skin and the respiratory passages covers the essential factors involved in the calculation of the complete water balance of the body. The incidental relationship between the total heat production of the body and the insensible loss of water is described. Since the latter factor is influenced by such factors as the state of hydration of the body and the osmotic pressure of the body fluids, it cannot be regarded as an accurate gage of the energy metabolism except under the most limited conditions. The composition of sweat under various conditions is also discussed in this chapter. The conclusion is drawn that the excretory function of the skin is attuned to regulation of the body temperature rather than to the elimination of water and solutes.

Les nourrissons débiles et prématurés. By L. Ribadeau-Dumas and Marie Lataste. Paper. Price, 16 francs. Pp. 106, with 10 illustrations. Paris: Masson & Cie, 1935.

This is another volume of the series on practical medicine and surgery. It deals with the care and feeding of the premature and the congenitally inferior infant. A short discussion of the etiology of these conditions is given, followed by a discussion of the food elements necessary in nutrition. This is followed by a consideration of the practical application of these principles and a few reports of illustrative cases. It is interesting to note that breast milk is considered to be by far the feeding of choice. A short chapter on digestive disturbances is given. The book is a concise discussion of the care of premature infants, and the matter contained is sound and practical.

The Parathyroids in Health and in Disease. By David H. Shelling, B.Sc., M.D., Johns Hopkins University and Hospital. Price, $5. Pp. 335, with 26 illustrations. St. Louis: C. V. Mosby Company.

The growth of knowledge regarding the functions of the parathyroids has been rapid during the past decade. The studies of laboratory workers on the parathyroid hormone and its effects on the body chemistry have been brilliant and have opened intriguing opportunities to clinicians, both medical and surgical. Unfortunately, in the furore over new operative and therapeutic possibilities, both physicians and surgeons have been tempted to go beyond, or even in the face of, the information that has come from the laboratories and have been led to unwarranted procedures in the use of the hormone, on the one hand, and on the use of surgical intervention, on the other. Doubtless, part of this confusion has

been due to the fact that collected, correlated information on the physiology, pathology and biochemistry of the glands and their secretion was not readily available, and it was not generally appreciated that the question of the parathyroids is essentially a laboratory problem.

There has been a definite need for a collection and correlation of the present knowledge on the subject, such as Shelling has attempted in this monograph. He deals with the question in all its phases, as is indicated by the chapter headings: "Anatomy"; "Pathology"; "Physiology"; "The Parathyroid Hormone"; "Tetany and Hypoparathyroidism"; "Hyperparathyroidism and Osteitis Fibrosa"; "The Relation of the Parathyroids to Other Glands of Internal Secretion"; "The Relation of the Parathyroids to Vitamin D," and "The Use and Misuse of Parathyroid Hormone," and Shelling has done his work, on the whole, very well. It is not possible, in a limited monograph, to include everything that might be desired by workers in special fields, but this difficulty is met by the complete bibliographies appended to the various chapters. The most serious difficulty is to present so large a mass of laboratory and clinical information, much of it on subjects still under active investigation, in such a way as not to leave the average reader with a feeling of confusion. Here Shelling has not been altogether successful, as are few writers of such reviews. One might wish for more concise and lucid summaries of the data in some of the chapters. He has been most successful in presenting the biochemical problems involved and has driven home well the fundamental principle that the clinician must lean constantly on the laboratory if he is to deal intelligently with these problems.

The book is the best compilation of information on its subject of which the reviewer is aware and might be read with profit by any one interested in this very live question.

Your Child in Health and in Sickness. By Hugh L. Dwyer, M.D. Price, $2.75. Pp. 333, with 32 illustrations. New York: Alfred A. Knopf, 1936.

This book contains material on the care of the expectant mother, preparations for the baby, the new-born, the daily routine, growth and development, feeding, mixed diets, digestive disturbances, eating habits, vitamins, diseases of nutrition, posture, mental health, bad habits, contagious diseases, common diseases of childhood and emergencies. These subjects are all discussed in a readable manner which should be popular with the mother. The parts on eating habits, posture and training and mental health are especially good and are not found in most popular books for the laity. As to criticism, the reviewer does not believe that it is wise to give prepartum instruction to the mother in a book on pediatrics. The expectant mother is liable to receive too much varied advice as it is, and he thinks that her obstetrician is the only one qualified to give it. Also, why is it necessary to mention specified commercial products, as "Two of the best cereals before the baby comes, as well as for the nursing mother are Ralston's wheat cereal, and Mead's cereal"? Would not the simple statement that whole grained cereals are best answer as well? In the discussion of nutritional anemia one finds the following "Mead's Cereal or Pablum is an excellent source of iron. Of the sugars used to modify the infant's formula cane sugar and milk sugar are free from iron. Mellin's Food and the maltose-dextrin preparations made from whole grain cereals contain some iron and copper." Surely such small controversial points will only make the mother suspicious of formulas that do not agree with this.

The book is well written and contains a mine of useful information to the mother. The printing and plates are excellent, and the subjects are well chosen.

Directory of Pediatric Societies *

INTERNATIONAL

International Association of Preventive Pediatrics

President: Professor G. Scheltema, 6a Heereplein, Groningen, The Netherlands.
Secretary: Dr. Daniel Oltramare, 15 Rue Lévrier, Geneva, Switzerland.

FOREIGN

British Paediatric Association

President: Dr. Hugh Thursfield, 84, Wimpole St., London, W. 1.
Secretary: Dr. Arthur G. Maitland Jones, 31 A, Weymouth St., London, W. 1.

Royal Society of Medicine, Section for the Study of Disease in Children

President: Sir Lancelot Barrington-Ward, 85 Harley St., London, W. 1.
Secretary: Dr. K. H. Tallerman, 122 Harley St., London, W. 1.
Place: 1, Wimpole St., London. Time: Fourth Friday of each month, 4:30 p. m.

Paediatrický Spolok na Slovensku

President: Dr. A. J. Chura, Lazaretská 6, Bratislava, Czechoslovakia.
Secretary: Dr. S. Limbacher, Dlhá 2, Bratislava, Czechoslovakia.
Place: Pediatric Clinic, University, Bratislava. Time: Six times a year.

Sociedad Cubana de Pediatría

President: Prof. Félix Hurtado Galtés, Carlos III, 7, Havana.
Secretary: Dr. Carlos Hernández Miyares, San Lazaro 370, Havana.
Place: Cátedra de Clínica Infantil, Hospital Mercedes, Havana. Time: Third Thursday of every month.

NATIONAL

American Medical Association, Scientific Assembly, Section on Diseases of Children

Chairman: Dr. Horton R. Casparis, Vanderbilt University Hospital, Nashville, Tenn.
Secretary: Dr. Ralph M. Tyson, 255 S. 17th St., Philadelphia.
Place: Kansas City, Mo. Time: May 11-15, 1936.

American Academy of Pediatrics

President: Dr. Henry Dietrich, 1136 W. Sixth St., Los Angeles.
Secretary: Dr. C. G. Grulee, 636 Church St., Evanston, Ill.
Region II. Place: Baltimore. Time: Nov. 16 and 17, 1936.
Region III. Place: Cincinnati. Time: Nov. 20 and 21, 1936.
Region: IV. Place: San Francisco. Time: Oct. 22-24, 1936.

American Hospital Association, Children's Hospital Section

President: Mr. Robert Witham, Children's Hospital, Denver.
Secretary: Miss Agnes O'Roke, Kosair Crippled Children's Hospital, Louisville, Ky.

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* Secretaries of societies are requested to furnish the information necessary to make this list complete and to keep it up to date.

AMERICAN PEDIATRIC SOCIETY

President: Dr. Fritz B. Talbot, 270 Commonwealth Ave., Boston.
Secretary-Treasurer: Dr. Hugh McCulloch, 325 N. Euclid St., St. Louis.
Place: Bolton Landing, N. Y. Time: June 11-13, 1936.

CANADIAN SOCIETY FOR THE STUDY OF DISEASES OF CHILDREN

President: Dr. A. P. Hart, 1844 Bloor St., W., Toronto, Ont.
Secretary-Treasurer: Dr. Pearl Summerfeldt, Hospital for Sick Children, Toronto, Ont.
Place: Bolton Landing, N. Y. Time: June 11-13, 1936.

SOCIETY FOR PEDIATRIC RESEARCH

President: Dr. C. F. McKhann, Children's Hospital, Boston.
Secretary: Dr. A. A. Weech, 3975 Broadway, New York.

SECTIONAL

NORTH PACIFIC PEDIATRIC SOCIETY

President: Dr. L. Howard Smith, 1020 S. W. Taylor St., Portland, Ore.
Secretary: Dr. Morris Bridgeman, Children's Clinic, Portland, Ore.

SOUTHERN MEDICAL ASSOCIATION, SECTION ON PEDIATRICS

Chairman: Dr. Madison Hines Roberts, 104 Ponce de Leon Ave., N. E., Atlanta, Ga.
Secretary: Dr. Hughes Kennedy Jr., Highland Plaza Apts., Birmingham, Ala.

STATE

ALABAMA PEDIATRIC SOCIETY

President: Dr. J. W. Britton, 931 Noble St., Anniston.
Secretary-Treasurer: Dr. Wallace Clyde, Employees' Hospital, Fairfield.

ARKANSAS STATE PEDIATRIC ASSOCIATION

Chairman: Dr. Morgan Smith, 625 Beech St., Little Rock.
Secretary: Dr. Madeline A. M. Melson, 2111 N. Spruce St., Little Rock.

CALIFORNIA STATE MEDICAL SOCIETY, SECTION ON PEDIATRICS

Chairman: Dr. S. J. McClendon, 2001 Fourth Ave., San Diego.
Secretary: Dr. Edward B. Shaw, 384 Post St., San Francisco.
Place: Coronado. Time: May 25-28, 1936.

FLORIDA STATE PEDIATRIC SOCIETY

President: Dr. Luther W. Holloway, 117 W. Duval St., Jacksonville.
Secretary: Dr. Warren W. Quillian, 227 Avenue Aragon, Miami.
Place: Concurrent with state association meeting at time of convention.

GEORGIA PEDIATRIC SOCIETY

President: Dr. William Willis Anderson, 478 Peachtree St., Atlanta.
Secretary-Treasurer: Dr. Roger W. Dickson, 33 Ponce de Leon Ave., N. E., Atlanta.
Place: Atlanta, December 1935. Savannah, June 1936.

INDIANA STATE PEDIATRIC SOCIETY

President: Dr. Milo K. Miller, 122 N. Lafayette Blvd., South Bend.
Secretary-Treasurer: Dr. Mathew Winters, 23 E. Ohio St., Indianapolis.
Time: Two meetings a year.

LOUISIANA STATE PEDIATRIC SOCIETY

President: Dr. Charles James Bloom, 3439 Prytania St., New Orleans.
Secretary-Treasurer: Dr. J. A. Crawford, 834 Ryan St., Lake Charles.

MEDICAL SOCIETY OF STATE OF NEW YORK, SECTION ON PEDIATRICS

Chairman: Dr. George M. Retan, 459 James St., Syracuse.
Secretary: Dr. John D. Craig, 33 E. 61st St., New York.
Place: New York City. Time: April 27-29, 1936.

MICHIGAN STATE MEDICAL SOCIETY, PEDIATRIC SECTION

Chairman: Dr. Edgar E. Martmer, 749 David Whitney Bldg., Detroit.
Secretary: Dr. C. R. Dengler, 131 W. Michigan Ave., Jackson.

MISSISSIPPI STATE PEDIATRIC SOCIETY

President: Dr. R. E. Wilson, 205 S. Harvey St., Greenville.
Secretary-Treasurer: Dr. Guy C. Jarratt, 920 Crawford St., Vicksburg.
Place: To be designated by Society. Time: Yearly.

NEBRASKA PEDIATRIC SOCIETY

President: Dr. J. A. Henske, 1614 Medical Arts Bldg., Omaha.
Secretary-Treasurer: Dr. J. H. Murphy, 915 Medical Arts Bldg., Omaha.
Place: As announced by committee. Time: Third Thursday of each month from October to June, inclusive. Dinner at 6 p. m.

NORTH CAROLINA PEDIATRIC SOCIETY

President: Dr. J. R. Ashe, 306 N. Tryon St., Charlotte.
Secretary: Dr. R. A. Moore, 306 N. Tryon St., Charlotte.
Place: Pinehurst. Time: May 6, 1936.

OKLAHOMA STATE PEDIATRIC SOCIETY

President: Dr. Julian Feild, 610 S. Monroe St., Enid.
Secretary: Dr. B. H. Nicholson, 301 N. W. Twelfth St., Oklahoma City.

PENNSYLVANIA MEDICAL SOCIETY, PEDIATRIC SECTION

Chairman: Dr. Joseph Stokes, Children's Hospital, Philadelphia.
Secretary: Dr. Theodore O. Elterich, 310 Medical Arts Bldg., Pittsburgh.

SOUTH CAROLINA PEDIATRIC SOCIETY

President: Dr. William Weston Jr., 1428 Lady St., Columbia.
Secretary-Treasurer: Dr. Leland B. Salters, 317 S. Warley Ave., Florence.

TENNESSEE STATE PEDIATRIC SOCIETY

President: Dr. Joe T. Smith, 702 Medical Arts Bldg., Knoxville.
Secretary: Dr. Kinsey M. Buck, 1193 Madison Ave., Memphis.
Place: Memphis. Time: April 1936.

TEXAS PEDIATRIC SOCIETY

President: Dr. C. O. Terrell, 813 Medical Arts Bldg., Fort Worth.
Secretary-Treasurer: Dr. F. H. Lancaster, 1507 Medical Arts Bldg., Houston.

VIRGINIA PEDIATRIC SOCIETY

President: Dr. Basil B. Jones, 1028 W. Franklin St., Richmond.
Secretary: Dr. W. A. McGee, 616 W. Grace St., Richmond.

WEST VIRGINIA STATE MEDICAL SOCIETY, SECTION ON PEDIATRICS

President: Dr. John T. Thornton, 58, 16th St., Wheeling.
Secretary: Dr. Claude L. Holland, 400 Locust Ave., Fairmont.

LOCAL

Academy of Medicine of Cleveland, Pediatric Section

Chairman: Dr. J. D. Pilcher, City Hospital, Cleveland.
Secretary: Dr. William M. Champion, 2323 Prospect Ave., Cleveland.
Place: Cleveland Medical Library Bldg. Time: October, December, February and April.

Academy of Medicine, Toronto, Section of Pediatrics

President: Dr. T. B. Verner, 170 St. George St., Toronto.
Secretary: Dr. D. V. Hutton, 170 St. George St., Toronto.

Bronx Pediatric Society

President: Dr. Harry D. Pasachoff, 1560 Grand Concourse, New York.
Secretary: Dr. Samuel Tripler, 1555 Grand Concourse, New York.
Place: Concourse Plaza Hotel, 161st St. and Grand Concourse. Time: Every second Wednesday of each month, except June, July, August and September.

Brooklyn Academy of Pediatrics

President: Dr. Thurman B. Givan, 115 Remson St., Brooklyn.
Secretary: Dr. John A. Monfort, 861 Carroll St., Brooklyn.
Place: Kings County Medical Society Bldg. Time: Fourth Wednesday of each month, except May, June, July, August and September.

Central New York Pediatric Club

President: Dr. Frank Vander Bogert, 111 Union St., Schenectady.
Secretary: Dr. Frank J. Williams, 58 S. Swan St., Albany.
Place: Various cities in New York. Time: Third Thursday of April and September.

Chicago Pediatric Society

President: Dr. A. Levinson, 30 N. Michigan Ave., Chicago.
Secretary: Dr. James H. Wallace, 715 Lake St., Oak Park, Ill.
Place: Children's Memorial Hospital, 710 Fullerton Ave. Time: Third Tuesday of each month.

Dallas Pediatric Society

President: Dr. I. T. Nesbitt, 1719 Pacific Ave., Dallas, Texas.
Secretary: Dr. John E. Ashby, 614 Medical Arts Bldg., Dallas, Texas.
Place: Bradford Memorial Hospital. Time: 1 p. m., first and third Saturdays of each month.

Detroit Pediatric Society

President: Dr. Edgar E. Martmer, 749 David Whitney Bldg., Detroit.
Secretary: Dr. W. J. Scott, 5140 Second Ave., Detroit.
Place: Wayne County Medical Society. Time: 8:30 p. m., first Wednesday of each month.

Fulton County Medical Society, Pediatric Section (Atlanta, Ga.)

Chairman: Dr. Joseph Yampolsky, 478 Peachtree St., Atlanta.
Secretary: Dr. T. I. Willingham, 384 Peachtree St., Atlanta.
Place: Academy of Medicine, 38 Prescott St., N. E. Time: Second Thursday of each month from October to April, 8 p. m.

Harris County Pediatric Society

President: Dr. Byron P. York, 3820 Fannin St., Houston, Texas.
Secretary-Treasurer: Dr. E. O. Fitch, 3717 Main St., Houston, Texas.
Place: Houston Club. Time: Third Monday of each month.

HEZEKIAH BEARDSLEY PEDIATRIC CLUB OF CONNECTICUT

President: Dr. H. W. Brayton, 179 Allyn St., Hartford.
Secretary: Dr. Ernest Caulfield, 683 Asylum Ave., Hartford.

INTERMOUNTAIN PEDIATRIC SOCIETY

President: Eugene Smith, 385 Twenty-Fourth St., Ogden, Utah.
Secretary-Treasurer: Dr. W. C. Cheney, 837 Boston Bldg., Salt Lake City, Utah.
Place: Salt Lake City, General Hospital. Time: First Thursday of each month. 8 p. m.

KANSAS CITY (MISSOURI) PEDIATRIC SOCIETY

President: Dr. Harry M. Gilkey, 1103 Grand Ave., Kansas City.
Secretary: Dr. S. A. Stadler, 6133 Brookside Blvd., Kansas City.
Place: Kansas City General Hospital. Time: On call.

LOS ANGELES COUNTY MEDICAL ASSOCIATION, PEDIATRIC SECTION

President: Dr. George P. Laton, 1136 W. 6th St.
Secretary-Treasurer: Dr. Edwin F. Patton, 3875 Wilshire Blvd., Los Angeles.
Place: Los Angeles County Medical Headquarters, 1925 Wilshire Blvd.
Time: Second Monday of February, April, June, October and December.

MEDICAL SOCIETY OF THE COUNTY OF KINGS AND THE ACADEMY OF MEDICINE OF BROOKLYN, PEDIATRIC SECTION

President: Dr. Charles F. Fisher, 756 Eastern Parkway, Brooklyn.
Secretary: Dr. Harry Apfel, 988 Park Pl., Brooklyn.
Place: 1313 Bedford Ave., Brooklyn. Time: Third Wednesday of each month, October to May.

MEDICAL SOCIETY OF THE COUNTY OF QUEENS, INC., SECTION ON PEDIATRICS

Chairman: Dr. W. C. A. Steffen, 42 Union St., Flushing, N. Y.
Secretary-Treasurer: Dr. Edith A. Mittell, 144, 38th Ave., Flushing, N. Y.
Place: Queens County Medical Bldg., Forest Hills, N. Y. Time: Third Monday of October, January, March and May.

MEMPHIS PEDIATRIC SOCIETY

President: Dr. W. D. Mims, 1042 Madison Ave., Memphis, Tenn.
Secretary-Treasurer: Dr. W. R. Graves, 1193 Madison Ave., Memphis, Tenn.
Place: Memphis General Hospital. Time: Second Tuesday of each month, except June, July and August, 8 p. m.

MILWAUKEE PEDIATRIC SOCIETY

President: Dr. J. Gurney Taylor, 324 E. Wisconsin St., Milwaukee.
Secretary: Dr. H. B. Miner, 425 E. Wisconsin Ave., Milwaukee.
Place: Children's Hospital. Time: Second Wednesday of each alternate month, beginning with February.

NEW ENGLAND PEDIATRIC SOCIETY

President: Dr. Paul Emerson, 319 Longwood Ave., Boston.
Secretary-Treasurer: Dr. Henry E. Gallup, 66 Commonwealth Ave., Boston.
Place: Boston Medical Library. Time: Four meetings a year, occurring from September to May.

NEW YORK ACADEMY OF MEDICINE, SECTION OF PEDIATRICS

Chairman: Dr. Béla Schick, 17 E. 84th St., New York.
Secretary: Dr. Alexander T. Martin, 107 E. 85th St., New York.
Place: New York Academy of Medicine, 2 E. 103d St. Time: Second Thursday of each month from October to May, inclusive, 8:30 p. m.

Northwestern Pediatric Society

President: Dr. E. F. Robb, 1801 Lyndale Ave., S., Minneapolis.
Secretary: Dr. A. V. Stoesser, University Hospital, Minneapolis.

Philadelphia Pediatric Society

President: Dr. H. H. Perlman, 1904 N. Franklin St., Philadelphia.
Secretary: Dr. James E. Bowman, 4091 Comly St., Philadelphia.
Place: College of Physicians, 19 S. 22d St. Time: Second Tuesday of each month from October to June, inclusive.

Pittsburgh Pediatric Society

President: Dr. George J. Feldstein, 3401 5th Ave., Pittsburgh.
Secretary-Treasurer: Dr. E. R. McClusky, 3200 Fifth Ave., Pittsburgh.
Place: Pittsburgh Academy of Medicine. Time: Second Tuesday, alternate months from October to April, inclusive.

Richmond Pediatric Society

President: Dr. Samuel A. Anderson Jr., 2326 W. Grace St., Richmond, Va.
Secretary-Treasurer: Dr. Emily Gardner, 1100 W. Franklin St., Richmond, Va.
Place: Richmond Academy of Medicine, 1200 E. Clay St. Time: First Thursday of each month (except July, August and September).

Rochester Pediatric Society

President: Dr. F. W. Bush, 29 N. Goodman St., Rochester, N. Y.
Secretary: Dr. David Wolin, 16 N. Goodman St., Rochester, N. Y.
Place: Arranged by program committee. Time: Second Friday of each month.

Rocky Mountain Pediatric Society

President: Dr. Ralph Verploeg, 1850 Gilpin St., Denver.
Secretary: Dr. Max M. Ginsburg, Metropolitan Bldg., Denver.
Place: Children's Hospital, Denver. Time: First Saturday of each month from September to May, inclusive, 2:30 p. m.

St. Louis Pediatric Society

President: Dr. J. V. Cooke, St. Louis Children's Hospital, St. Louis.
Secretary-Treasurer: Dr. Katherine Bain, Beaumont Bldg., St. Louis.
Place: St. Louis Medical Society. Time: Third Friday of every month.

Seattle Pediatric Society

President: Dr. Arthur E. Wade, 1215, 4th Ave., Seattle.
Secretary: Dr. Walter B. Seelye, Cobb Bldg., Seattle.
Place: College Club. Time: Third Friday of each month, 6:30 p. m.

Southwestern Pediatric Society

President: Dr. Victor E. Stork, 1136 W. Sixth St., Los Angeles.
Secretary: Dr. Howard R. Cooder, 3875 Wilshire Blvd., Los Angeles.
Place: University Club of Los Angeles. Time: First Wednesday in January, March, May, September and November.

University of Michigan Pediatric and Infectious Disease Society

President: Dr. Samuel Levin, 2501 W. Grand Blvd., Detroit.
Secretary: Dr. D. Murray Cowie, University of Michigan, Ann Arbor, Mich.

Westchester County Medical Society, Pediatric Section (New York)

President: Dr. Louis V. Waldron, 149 N. Broadway, Yonkers, N. Y.
Secretary-Treasurer: Dr. Fairfax Hall, 421 Huguenot St., New Rochelle, N. Y.
Place: Grasslands Hospital. Time: Third Thursday, Oct., Dec., Feb. and April.